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ATHEMATICS LEARNING SYSTEM

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mpletely metric.

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e pupils' textbook for Canadian use. However, these do not affect
ie teaching of the program.

Metrication does not affect Level 1, because at this level the pupils
re not dealing with units of measurement. At all later levels, metric
nits are introduced and used throughout the program.

Teacher's Guide Level 1

2468848

Teacher's Guide
Level 1 Book 2

SRA MATHEMATICS LEARNING SYSTEM TEXT

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OBJECTIVES

Content objectives have been a part of instructional programs for years. Recently there has been an increased emphasis on being more specific about these objectives. Performance, instructional, educational, and behavioral objectives can be defined quite differently from one another, but there is little agreement as to a single definition for each kind. There is agreement about the purpose of objectives, however. This program was built upon learning objectives. Each objective clearly states what pupil behavior is to be observed, the conditions under which the pupil is to perform, and the criteria for acceptable performance.

These learning objectives by definition are limited to observable behavior; therefore they are automatically limited to the cognitive domain. This is a severe limitation, for the field-test information reveals that the affective domain also has been penetrated.

Increased pupil awareness of mathematics in the everyday world has been reported again and again. A greater pupil involvement in things relating to mathematics has been shown in the complete range of abilities. Attitudes have been changed. But writing objectives for the affective domain is a new endeavor, and frankly we have not yet mastered the art. The following, therefore, are learning objectives in the cognitive domain. Each objective states the performance expected at the completion of the first-level materials.

whole-number concepts

1. Given a set of from 0 to 100 members, the learner can count, say, and write the number of members in the set.
2. Given any two numbers from 0 to 100, the learner can compare the numbers by saying "more than," "less than," or "equal to."
3. Given orally the ordinal number (first, second, . . . , tenth) of a member of an ordered set of not more than ten the named member; given a specific the member; given a specific member of the set, the learner can say its ordinal name.

whole-number notation

1. Given any one of the numerals 0, 1, 2, 3, . . . , 100, the learner can read it aloud; given any one of these numerals aloud, the learner can write it.
2. Given a number of tens and a number of ones, the learner can write the corresponding numeral.

whole-number operations

1. Given an addition number fact written in horizontal or vertical form, the learner can say and write the sum.
2. Given any two numbers with a sum less than 100 requiring no renaming, the learner can find their sum.

geometry concepts

1. Given a set of objects such as boxes, cans, and balls, the learner can sort them according to their likenesses and differences.
2. Given objects such as boxes, cans, and balls, the learner can find flat surfaces and curved surfaces.

measurement

1. Given two objects with different lengths, the learner can identify the longer or the shorter object.
2. Given an appropriate but arbitrary unit of length, the learner can find the number of whole units in the length of an object.
3. Given two objects with different weights, the learner can identify the heavier or the lighter object.
4. Given a penny, nickel, dime, or quarter, the learner can identify it and give its value.
5. Given a clockface, the learner can tell time to the hour.

5 TELLING TIME

before this chapter the pupil has—

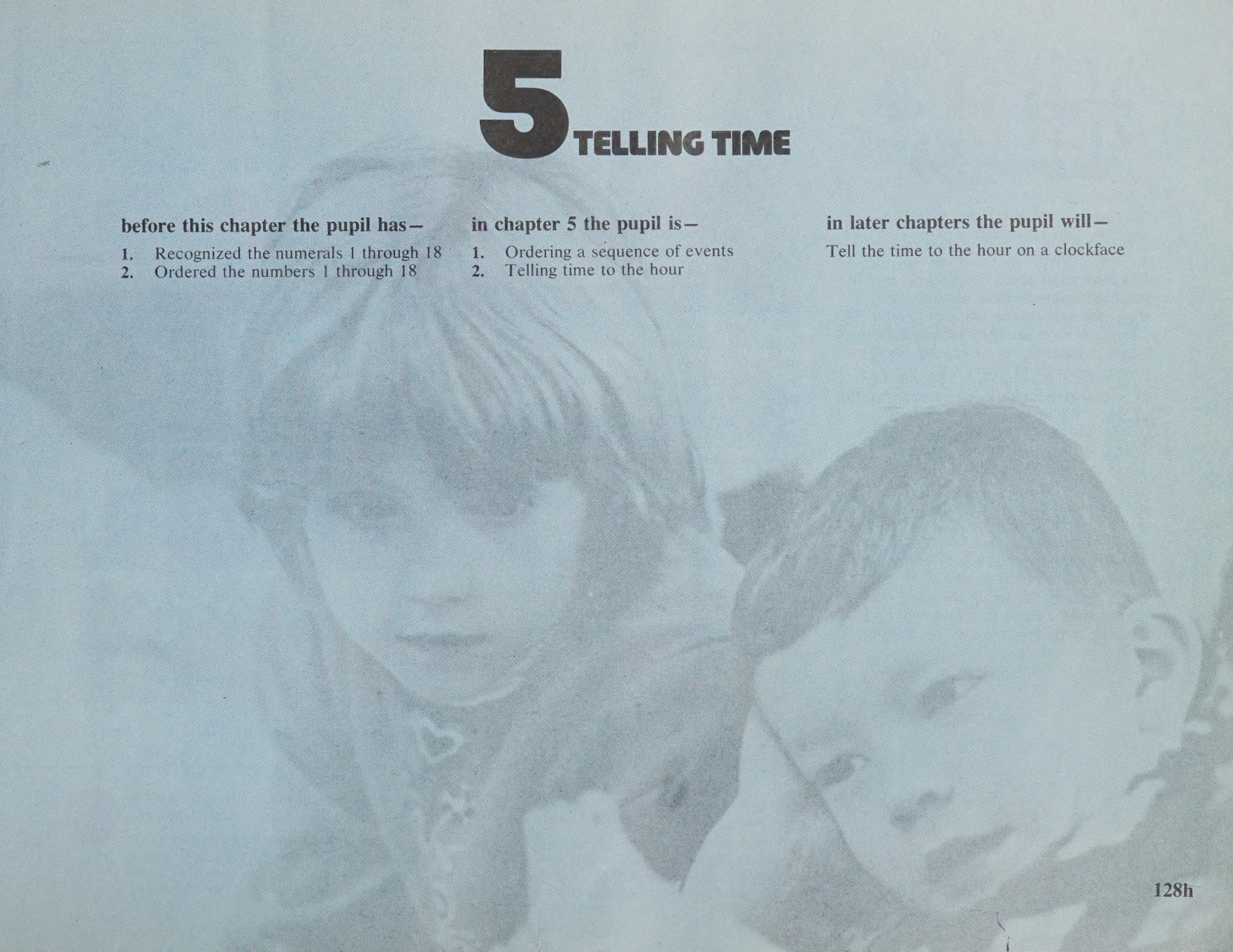
1. Recognized the numerals 1 through 18
2. Ordered the numbers 1 through 18

in chapter 5 the pupil is—

1. Ordering a sequence of events
2. Telling time to the hour

in later chapters the pupil will—

Tell the time to the hour on a clockface



Notes & Things

The goal of this level is to get acquainted with the face of a clock and to recognize time to the hour.

The first pupil pages will provide one of your first opportunities to allow more than one right answer to a set of questions. The life style of families is different enough so that you really can't depend on any given sequence of activities.

We apologize for using stereotypes in this chapter. We know full well that some people watch TV before they go to school while other families have no TV set in the home at all. Not all children carry lunch buckets. In fact, not all families have a mealtime when everyone sits down at a table. The hamburger joint or a raid of the refrigerator whenever someone is hungry is a very common mealtime that is not governed by the clock. Simply becoming aware of how many times we use the clock will be a first big step. Try to leave the children with the understanding that clocks are around for a reason. It is one way to help people live and work together. If you simply say you will meet someone somewhere, the first question that follows is "When?" If you agree to meet at 6:00 and you are where you are supposed to be when the clock says 6:00, everyone is happy. If you are late or if your clock isn't working right, then people are unhappy.

The face of the clock is one of the first places that the numerals 1 through 12 are used in order for a functional purpose.

It is important for the children to know the difference between your demonstration clock and a real one. If a real clock is working, there is a regular motion of the hands. When you work your demonstration clock, you aren't showing how long a minute or an hour is. You are just moving the hands to a position a real clock shows once during the day and once during the night.

words

The math concept words *before* and *after* take on a new meaning as you start talking about events rather than position. Be careful! Only three new words are presented in this chapter:

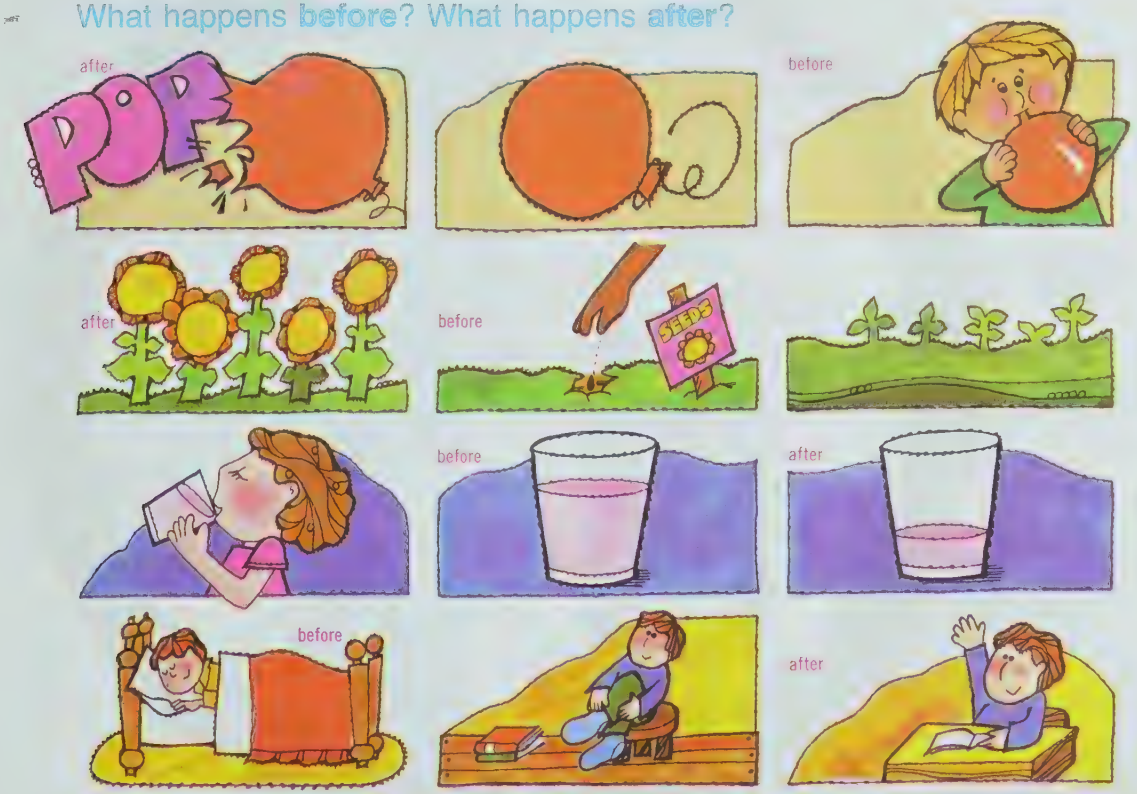
clock hour o'clock*

things

demonstration clock
paper plates and paper fasteners so each pupil can make his own clockface
spirit master with 8 clockfaces (The numerals and the minute hand pointing to 12 should be on each face.)

name _____

What happens before? What happens after?



© 1974, SRA PURPOSE: Introduction to time sequence.

lesson Pages 129, 130, 131

goal Examining the sequence of events

page 129 *Look at the first row of pictures. What's happening? What happens* ***before*** *a balloon is blown up? What happened next? Oops! What happened* ***after*** *the balloon was tied?*

Look at the next row. What's happening? Is that the way plants really grow, or are the pictures all mixed up? ***Before*** *a flower grows, what must happen? What happens next? After the plant grows leaves, what happens?*

Complete the page. Put an **X** on the picture that happens before and a ✓ on what happens after.

Careful of the last row. There may be disagreement on what the pictures show. The entire sequence depends on interpretation. Is the first picture at night or early morning? Is he getting ready to go to school or is he coming home?

Final question: *How do you know when to come to school?* Keep up the questions. until you get CLOCK as the answer.

things sets of pictures that show a time sequence, paste, construction paper

Raid your picture file for pictures that form a time sequence (summer, fall, winter, spring). Paste individual pictures on construction paper. Mix the set. Have the children put them in order.

things old newspapers and magazines, scissors, paste, construction paper

Groups of pupils can hunt for pictures to form a time sequence. After cutting out the pictures, they can paste them in sequence on the piece of paper. Have each group report to the class.

goal Introduction to the clock

things demonstration clock

page 130 No hints from teacher allowed!

What do you see? What is it used for? Where do you usually find one? Where's the strangest place you've ever seen one? What does it say at the top of the page? You may have to read it. *Name just one thing that's missing.*

Look at this clock. Use the demonstration clock. Set it for 9 o'clock. *Can you make the clock in your book look the same?*

Ask questions that lead the children to describe the clock. *How many numerals are on this* CLOCKFACE? *How many hands are on this clock? Do all clocks look like this one? What is the name of a clock that some people wear on their wrist? Does that kind of clock have the numerals 1, 2, 3, . . . , 12 on its face too?*

What would happen if there were no clocks of ***any kind*** *in this school? in your home? in our town?*

Everyone should do the suggested activity shown at the bottom of the page.

things for each pupil: paper plate, minute and hour hands, paper fastener

Time for everybody to make a clock. Duplicate the clockface and hands on page 133b. Let each child paste the face onto a paper plate.

The children are learning by doing and not focusing on perfection. Be ready to help them place the hands and push the fastener through the plate. Now we're ready to show 3 o'clock, 5 o'clock, and so on.

name _____

What happens before?

What happens after?

PURPOSE: Introduction to telling time.
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things pictures on page 129, paper, scissors, paste

Let the children cut out the pictures for each row on page 129 and paste them on paper in the order each series of events could happen.

goal Examining the sequence of events; telling time to the hour

things demonstration clock

warm-up Study the two hands of a demonstration clock. *How are they different?* (One is longer.) Position the hands to show 1:00. *What* HOUR *does the clock say?* (Don't expect everyone to answer.) Show 2:00. *What hour now?*

Continue in the same pattern. Show 3:00, 4:00, 5:00, 6:00. Then skip to 8:00, 9:00, 11:00, and 12:00. Ask what hour is showing each time. The children should catch on to the proper response.

Which hand tells the hour? (The shorter) *What happened to the longer hand each time an hour was shown?* (It stayed at 12.) *Does this hand always stay at 12?* Take time out to look at the clock in the room.

Is the shorter hand ever between two numbers on the clockface? Let's watch the clock on the wall today and see where the hands go.

page 131 *Who can read the two questions? Look at the first clock. What time does it say? Make a ✓ to show what you think happens before 9:00. Make an X to show what you think happens after 9:00.*

Do any ask if the last clock says 8:00 in the morning or 8:00 at night? (Cross your fingers—some might do so. It shows that they already know a lot about the clock.)

lesson Pages 132, 133

goal Telling time to the hour

things individual clocks

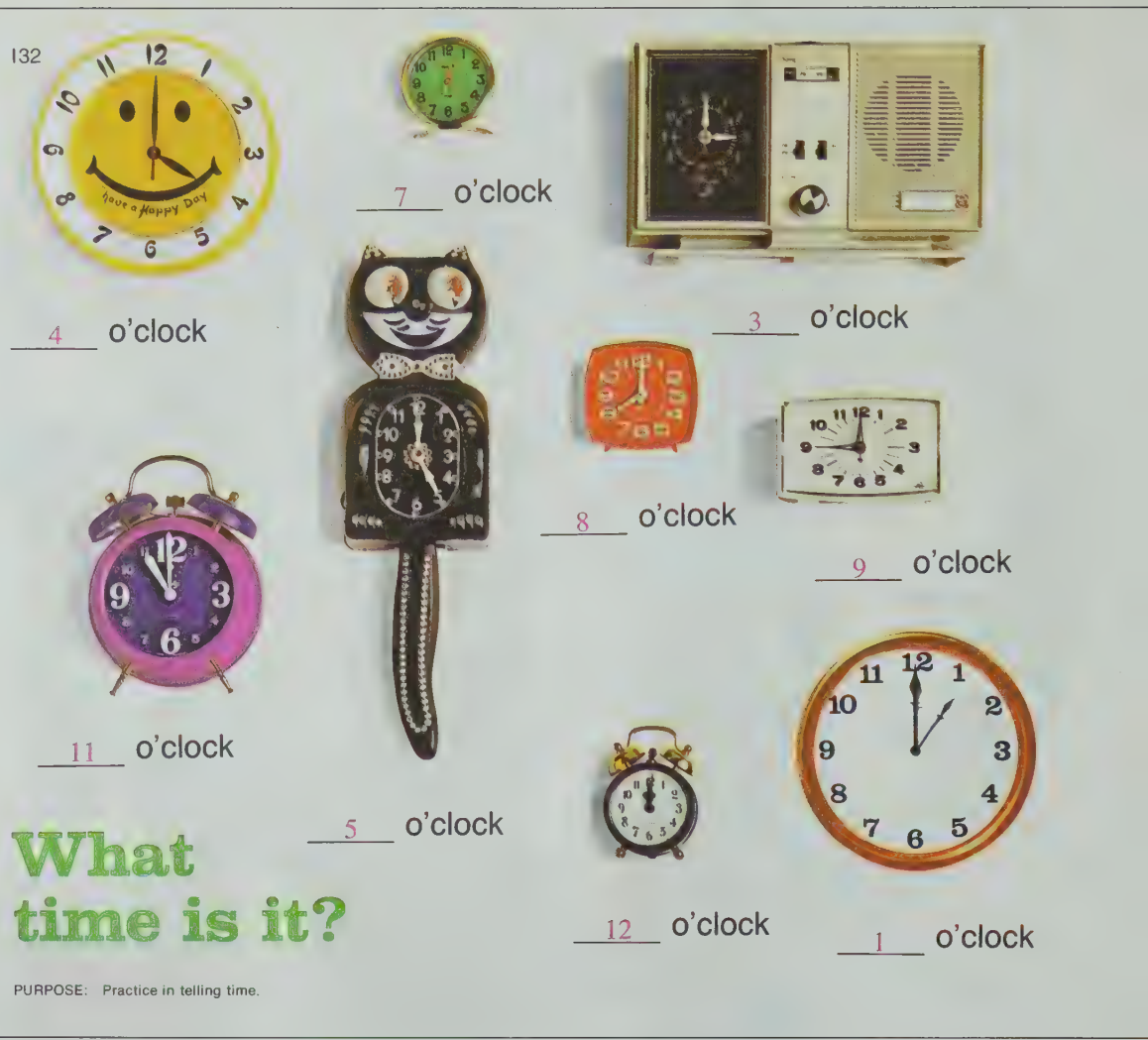
warm-up Recite "Hickory Dickory Dock." Have pupils show the time on their individual clocks.

How would the clock look when the clock struck one? Show me. Discuss the position of the hands. *How would the clock look at 2* O'CLOCK? Write the new word on the board. *This tells us a new hour is beginning.* Continue with other hours.

page 132 Read the question on the page.

Look at all the clocks. What number does the longer hand point to? Does it point to the same number on all the clocks on this page? Does the shorter hand point to the same number on each clock? What does this tell us? Where will you write the time shown on each clock?

Let the children work independently. Watch for any child who's having trouble seeing the different lengths of the hands. Compare answers. Ask how they knew what to write. Refer to the classroom clock throughout the school day.



name _____

Mark the time. Look for other good answers

© 1974, SRA PURPOSE: Checkout—telling time.

More practice with the paper-plate clocks. Focus on telling time to the hour only.

See activity, page 133a.

goal **Checkout**—telling time to the hour

page 133 *Hey, look! The clocks have only one hand. Can you tell the time when there is only one hand?*

A friend, Captain Time, is going to help us with this page. He'll answer the questions.

Get up? Captain Time says that we get up at 7 o'clock. Mark the clock to show 7:00.

Go to school? Captain Time says that you go to school by 9 o'clock. Mark the second clock to show 9:00.

Go to recess? Captain Time says that we go at 10 o'clock. Mark the next clock to show 10:00.

Eat lunch? Captain Time says that we eat at 12 o'clock. Mark the clock.

Go home? Captain Time says that we go home at 3 o'clock. Mark the clock.

Watch TV? Captain Time says that you watch at 4 o'clock. Mark the clock.

Eat again? Captain Time says that you are hungry at 6 o'clock. Mark the clock.

Go to bed? Captain Time says that you'll have a busy day tomorrow. You'd better be in bed by 8 o'clock. Mark the clock.

Do you think that Captain Time gave us some good help? What time do you get up? go to school? Let's watch for the time to go to recess, have lunch, and go home. What time do you watch TV? eat supper? go to bed?

When correcting, don't place undue emphasis on head-on accuracy in making the hour hand.

RESOURCES

another form of evaluation

for checkout—page 133

Use another copy of the duplicated clockfaces. Make up all the details of this story about a man who works on the night shift. (The story can be about a male nurse, a baker, a policeman, or a factory worker.) The pupil will mark a clockface to show the hours you indicate.

Mr. Minute has to be at work at 11:00 at night. He has lunch at 2:00 in the morning, then works until 7:00. He has dinner (supper) at 8:00 in the morning; goes shopping until 12:00 noon; goes to bed at 1:00 in the afternoon; sleeps until 9:00; has breakfast at 10:00 at night; and goes to work again.

There is some good extra learning about the clock's showing both day time and night time. The story itself is interesting enough so that you may be able to have some talk about whether a story like this could be true.

activities

things Spirit master with clockfaces (no hour or minute hand)—2 copies for each pupil

Use one spirit master to keep track of what happens at school. *School has started. Put in the hands on your clock so that it will look like the one on the wall. What time is it? . . . It is time for recess. Make your clock look like the one on the wall. What time is it?* Record time for lunch, for other classes, for a dental appointment, and so on. Use the other copy to send home. Ask the children to put the hands on the clockface to show events such as dinnertime, time of a favorite TV program, bedtime, and get-up time. They can draw a picture beside the clock to identify the event itself.

additional learning aids

concept—chapter objectives 1 and 2

SRA products

Skill through Patterns, level 1, SRA (1974)
Spirit master: 26
Visual Approach to Mathematics, level 1, SRA (1967)
Visual: 20, first activity

other learning aids (described on page 256g)—Judy Clock, Judy Mini-Clocks, Sequence Cards, Willbrook Discovery Math Work Cards (time)

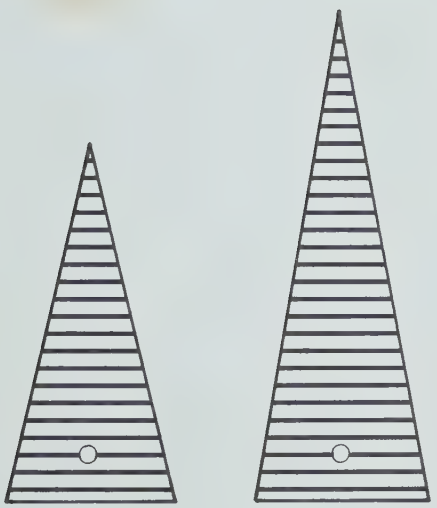
letter to parents

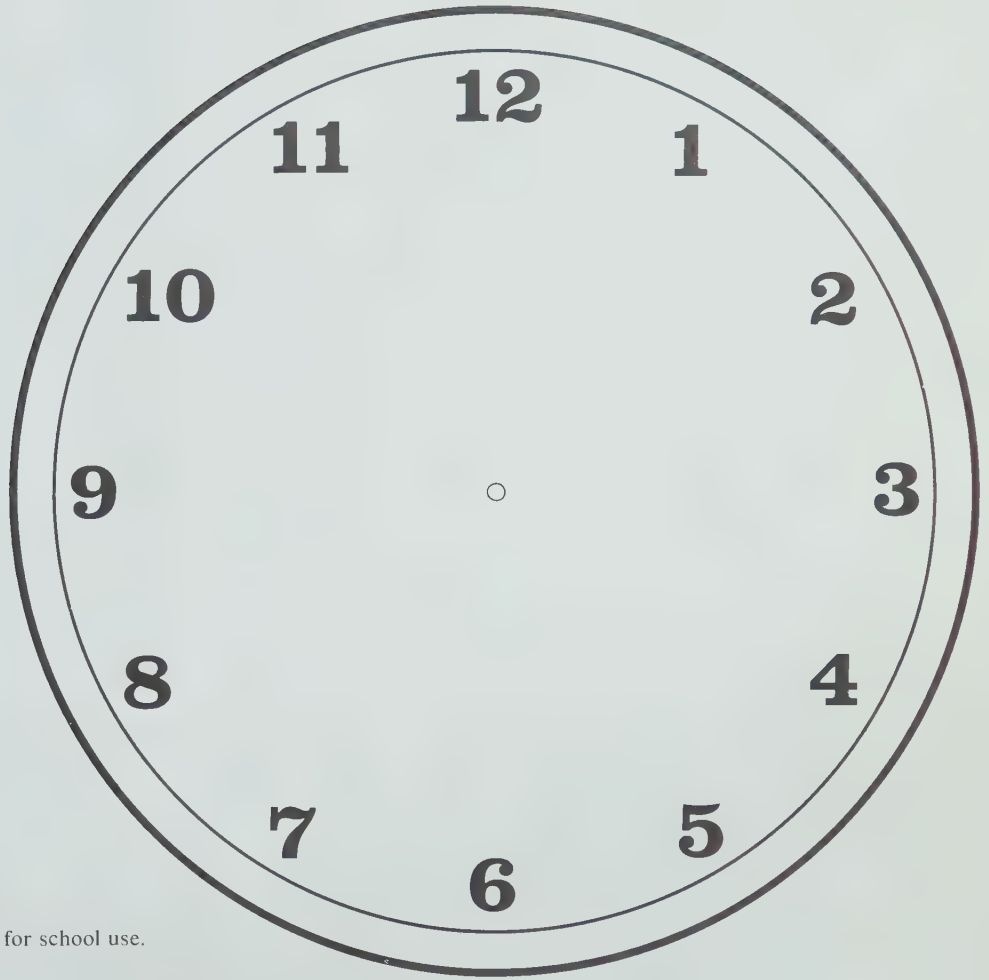
Dear Parents,

Your child should now be able to tell you by looking at the clock if it is time for the six o'clock news or if it is twelve o'clock and time to eat. If you have an old clock around that can be played with, he should be able to tell you what the clock says whenever the hands point to an hour. We *didn't* work on the notion of 7:00 A.M. or 7:00 P.M., so don't expect that skill. We'll save that for later.

We have completed our study of how our number system works. Your child knows that the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 are all the symbols that are needed to write larger numbers. We will continue to work with the egg-carton ten-trays to get the idea of large numbers established. Five full ten-trays hold 50 objects, ten full ten-trays hold 100, and so on.

Do you save pennies at your house? Or might there be something like a box of 100 nails around? Counting up to 100 objects will be very helpful. You may want to go still further and count sets of ten toothpicks; then bundle them together with a rubber band. Then your youngster can show you how tens and ones are counted, as well as give the number that tells how many.





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6 CONCEPT OF PLACE VALUE

before this chapter the pupil has—

1. Counted sets of ten
2. Counted sets of ten through eighteen and recorded how many

in chapter 6 the pupil is—

1. Counting by tens to 100
2. Developing the concept of place value for 2-digit numbers
3. Writing the numerals 0 through 100
4. Writing numbers that are one more, that are one less, or that come between other 2-digit numbers

in later chapters the pupil will—

1. Count, say, and write the number of members in a set of zero through one hundred
2. Compare two numbers from 0 through 100 by saying "more than," "less than," or "equal to"
3. Add any two numbers with a sum less than 100 and requiring no renaming

Notes & Things

Filling one ten-tray and having one or more extra counters has been the only readiness activity for this chapter on place value. There has been very little emphasis on the number ten. The numbers through eighteen have been developed simply as the way to write the answer to the question of how many. The children really are not yet aware that there are only ten digits that are put together in various ways to write other numbers. In this chapter we begin the study of our numeration system and how it works.

Ten-trays will be used extensively to reinforce the concept of ten, whether or not the trays are filled. Continued experience with matching one counter with one cup of the ten-tray is a valuable learning experience. If you prefer bundles of sticks, please use them after you have used the ten-trays enough so that the illustrations on the pupil pages will not be confusing.

You will probably find some pupils still not willing to accept that a full ten-tray has ten counters in it. Let these pupils satisfy themselves by counting a full tray again and again until they feel secure that the number of objects won't change. This is an important first step. You will never get the number ninety established, for example, if the pupil continues to count the number in each of nine full trays.

The place-value words will always appear as a heading when the children are first learning to write 2-digit numerals.

A "show-me chart" is a simple place-value pocket chart that each child uses. As he begins to use his numeral cards in the place-value locations, a strong intuitive understanding of our numeration system begins.

With this understanding plus a knowledge of the number facts, addition of two 2-digit numbers will be easy.

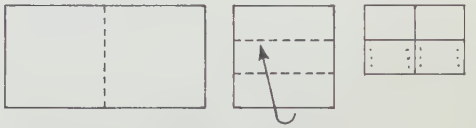
words

Once again there are very few concept-development words to introduce in this chapter. The pupils will see the word *more* on their pages along with

ten-trays
tens
ones

things

ten-trays—as many as you can find
counters—enough to fill the trays plus some more
oak tag or heavy construction paper so each pupil can have a "show-me chart"



One sheet will make two charts. Have the pupils label the charts.

They will need two sets of the 3-cm-wide numeral cards to use with these charts.

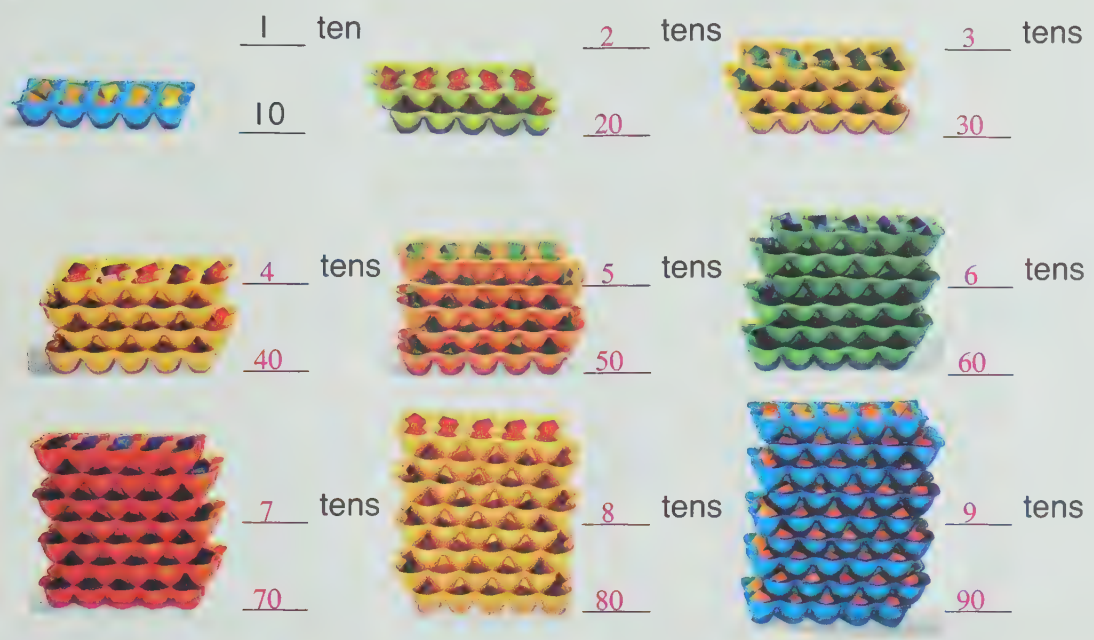
lesson Pages 134, 135

goal Introduction to grouping by tens

page 134 *Wow! That certainly is a lot of pennies! How many do you think there are?* (There are 97—just in case someone really does try to count each one.)

Have fun with this discussion page. If you collect milk or lunch money, share with the children how you group it to make the counting easier. Try counting the stacks of pennies by 10—20, 30, . . . , 90. This may not be easy.

name _____



Count by tens.

10, 20, 30, 40, 50, 60, 70, 80, 90, 100

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PURPOSE: Counting sets of tens.

things for each pupil: 10 index cards, gummed dots

The pupils put 10 dots on each card to make ten-cards. Then have them count—1 ten, 2 tens, . . . , 10 tens as they lay down each card.

Begin again. This time as each card is laid down ask, "How many tens? How many dots?" Summarize this counting in a chart.

Ten-cards	Dots
1	10
2	20
3	30

goal Counting by tens to 100

things 10 full ten-trays

warm-up Set out 10 full ten-trays in a place where everyone can gather around.

Are all the trays full? Hold up 1 tray. *How many* TEN-TRAYS? Write **1 ten** on the board. *How many counters in this tray?* Write 10. Stack a tray on top of the one you are holding. *Now how many ten-trays?* Write **2 tens.** *How many counters in all?* Write 20.

You'll probably have to work to get 20 for an answer. If necessary, have the pupils count from the 10 in the first tray to 20. Continue until all trays are stacked and each is recorded. Count by tens from 10 each time you ask, "How many in all?"

page 135 A **do-together** page. Direct attention to the single ten-tray.

If the ten-tray is full, it can be called ***1 ten.*** *Is the one in the book full? You can make sure by counting. Are there 10 in it? Why is there a 10 written under 1 ten?*

If there are 2 ten-trays, how many tens do we write? If there are 2 ten-trays—or 2 tens—how many counters in all? Count by tens—10, 20.

HAVE PATIENCE!

The switch from 10 counters to 1 ten is not easy.

lesson Pages 136, 137

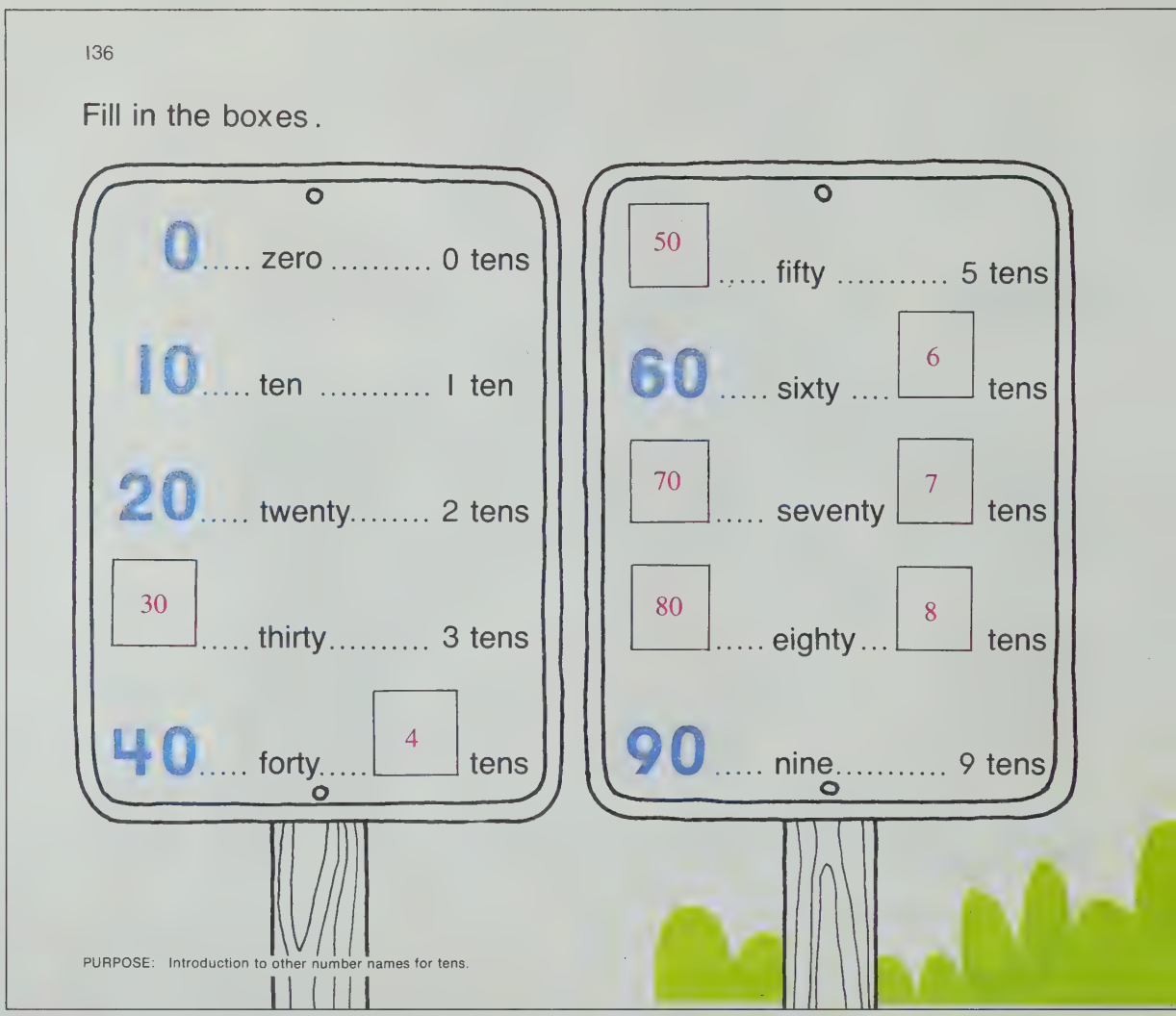
goal Examining different ways to write tens

memo This is not the time to force the pupils to learn number words as sight words. Rather, emphasize that there are different ways of writing a number.

things 9 full ten-trays

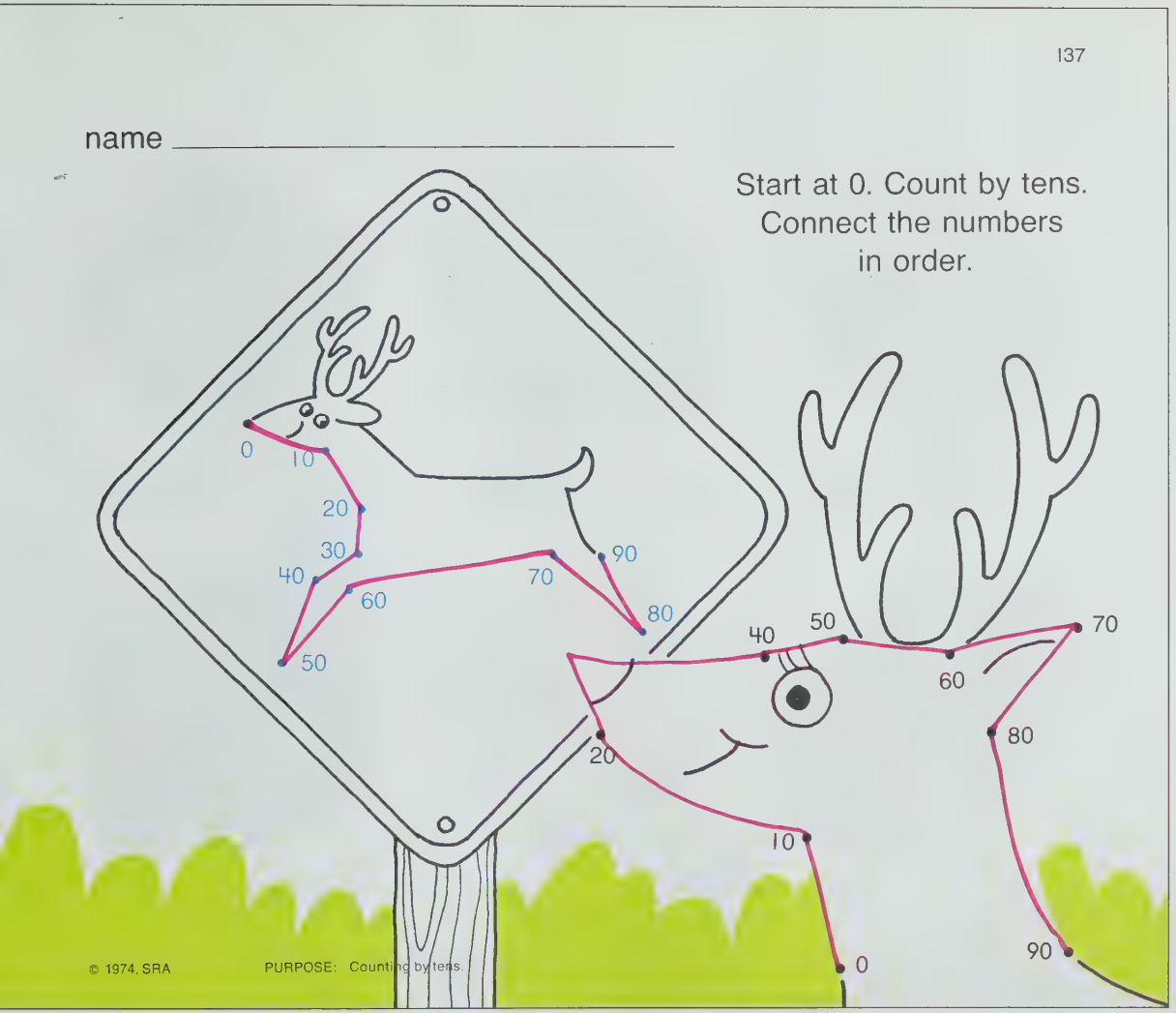
page 136 *All eyes on the sign on the left. What is the first numeral? The word says zero also. And next to the word is still another way of writing zero. Can you read it?*

Continue down the road sign, filling in blanks where they occur. Then on to the next road sign. Have a child show each number with full ten-trays. The class can prove how many by counting—by tens.


136
Fill in the boxes.
0 ..... zero ..... 0 tens
10 ..... ten ..... 1 ten
20 ..... twenty..... 2 tens
30 ..... thirty..... 3 tens
40 ..... forty..... 4 tens
50 ..... fifty ..... 5 tens
60 ..... sixty .... 6 tens
70 ..... seventy 7 tens
80 ..... eighty... 8 tens
90 ..... nine..... 9 tens
PURPOSE: Introduction to other number names for tens.

STOP

You have used bundles of sticks every year that you have taught this level. Do it again. The bundles are a great learning aid.



goal Practice in counting by tens

things 10 full ten-trays

warm-up Review counting by tens, using the ten-trays. Try beginning with 3 trays and counting to 6 trays (30–60) for variety. Show a stack of 5 trays. Ask how many.

page 137 *Gee, this is a funny-looking page. The numbers don't go from 0 to 1 and then to 2. How do they go? How will you be counting?*

Point out that there are two sets of numbers to connect.

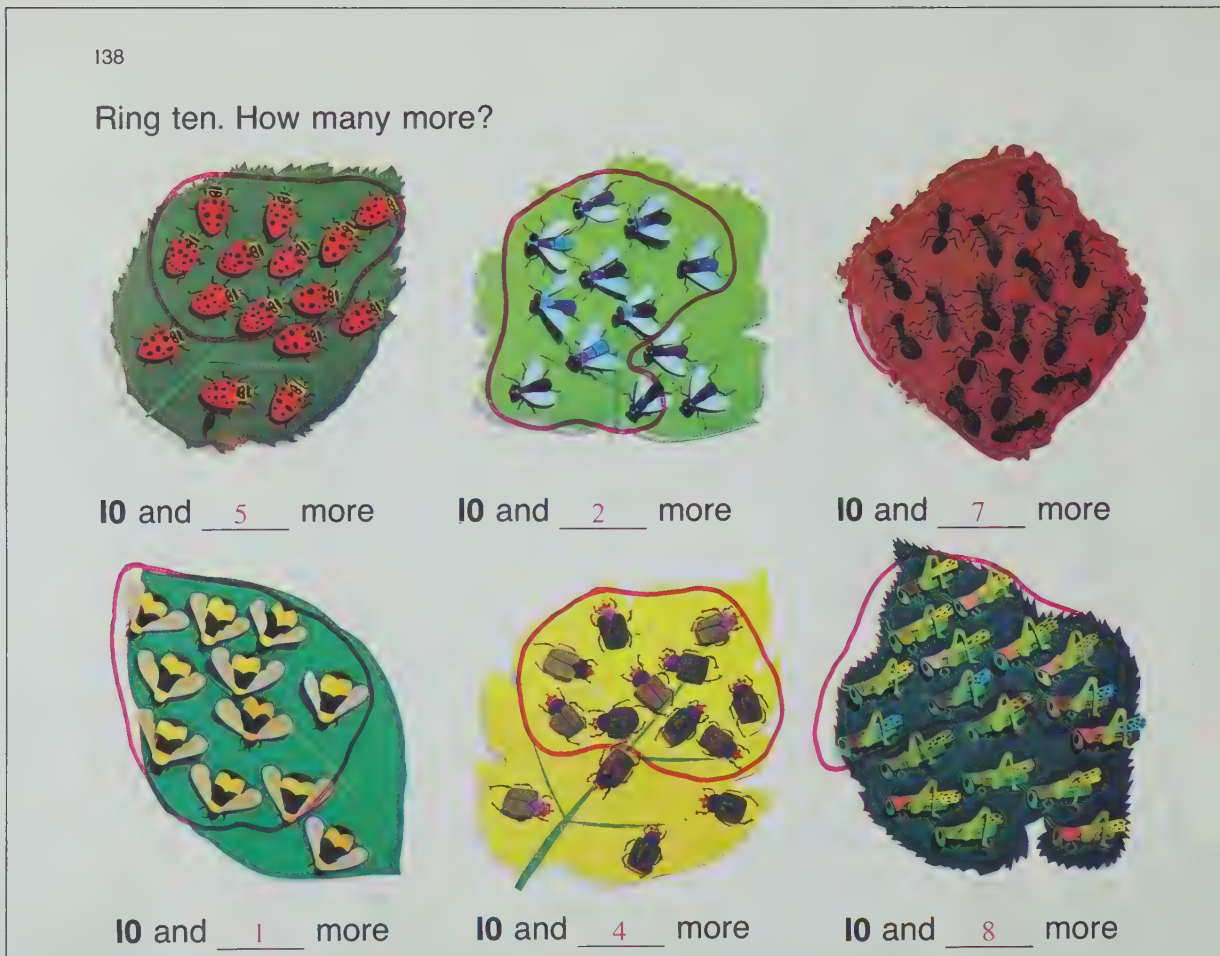
lesson Pages 138, 139

goal Introduction to grouping by tens and some more

things 1 ten-tray
19 counters

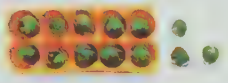
warm-up Put 14 counters in a pile. (Keep the other 5 in your pocket.) *What a mess! How many counters are there?* Get one youngster to tell you. If you're lucky, he will fill the ten-tray without taking time to count and will count only those that didn't fit. If he does, give glorious praise. But if he counts the whole thing, add a couple of counters to the pile and try with another child. You should get to the point where everyone is thinking **10 and ____ more** if possible. (And it may not be possible.) If it doesn't happen today, try again tomorrow.

page 138 Identify the various kinds of bugs. Do the first problem together. As soon as the children understand, have them continue independently.


138
Ring ten. How many more?
10 and 5 more
10 and 2 more
10 and 7 more
10 and 1 more
10 and 4 more
10 and 8 more
PURPOSE: Grouping by tens; introduction to place value.

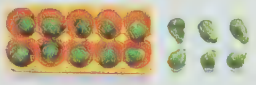
name _____

Tell how many.



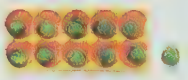
1 ten-tray

3 more



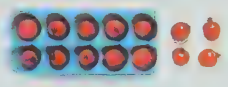
1 ten-tray

6 more



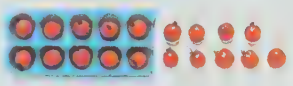
1 ten-tray

1 more



1 ten-tray

4 more

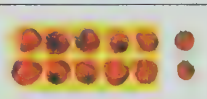


1 ten-tray

9 more

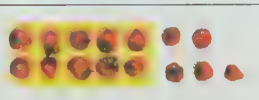
1 ten-tray

7 more



1 ten-tray

2 more



1 ten-tray

5 more

© 1974, SRA PURPOSE: Grouping by tens.

goal Finding how many in a group of tens and some more

memo Before you do anything with the page, ask them to look at the first ten-tray. *Is it full? How many counters in the tray?* If anyone starts to count, you will know that there is one person who needs some more help and practice. Pupils will never get through the next pages by counting ones.

page 139 Do the first row together. *How many full ten-trays? How many more?* If any child has trouble, use real ten-trays and counters.

lesson Pages 140, 141

goal Grouping by tens and some more

things 3 full ten-trays
5 extra counters

warm-up Write the following on the board four times:
How many? _____ ten-trays _____ more

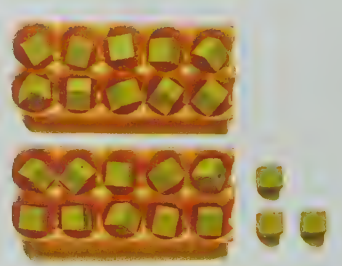
Display 1 full ten-tray and 3 counters. Record how many.

Continue with 2 full trays and 4,
3 full trays and 5,
2 full trays and 1.

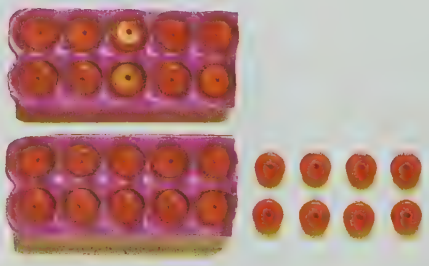
page 140 The children should be able to tell you how to do this page. Try them. Those who are able should work independently.

Tell how many.

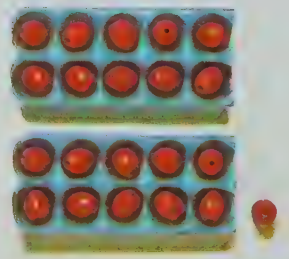
2 ten-trays 7 more



2 ten-trays 3 more



2 ten-trays 8 more



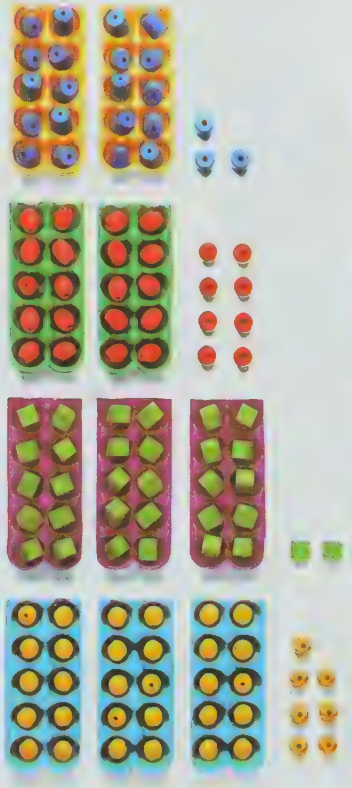
2 ten-trays 1 more

PURPOSE: Grouping by tens; introduction to place value (continued).

Use those bundles of sticks again. Every type of hands-on experience is a must for those who just aren't with it.

name _____

Write how many.



ten-trays	more
2	3

ten-trays	more
2	8

ten-trays	more

ten-trays	more
3	7

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PURPOSE: Grouping by tens; practice with place value.

goal Development of the concept of place value

things 4 full ten-trays
5 extra counters

warm-up Write the following on the board four times:

ten-trays	more

Display 2 full ten-trays and 3 more. Record. Count—10, 20, 21, 22, 23. *Gee! That's what we wrote!* Continue with 3 full trays and 4, 4 full trays and 3, 2 full trays and 5.

page 141 Again, there should be no problem with directions. Act puzzled. Ask what to do. Those who can should work independently. Count together to check. Have each numeral read.

lesson Pages 142, 143

goal Development of the concept of place value

page 142 Hopefully, no problems—children should know what to do on sight. If not, count some actual trays (by tens) and record how many. Then return to the page. Check by counting first and then by having the numeral read.

142

Write how many.

ten-trays	more
1	0

ten-trays	more
2	0

ten-trays	more
3	0

ten-trays	more
4	0

ten-trays	more
5	0

PURPOSE: Grouping by tens; practice with place value.

name _____

Write how many.

ten-trays	more	
tens	ones	
2	5	25
1	9	19

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PURPOSE: Practice with place value.

goal Development of place value by recording tens and ones

memo Use ten-trays for proof of the answer.

things for each group:
5 ten-trays and 59 counters

warm-up Group the children. Place the counters and empty ten-trays in the middle of the group. *Who can tell me how many all together?*

I'm going to write a number on the board. Use your trays and counters and show me the number. Write 31. Give glowing praise for correct work. *Dump the trays and get ready for another.* Write 47. *Good! One more time.* Write 59. Maybe someone will remember that that's the number they started with.

Ready for a change? One person from each group goes to the board. He writes the number that you say while the rest use their ten-trays and counters to show the number. *Show me 3 tens and 1 more . . . 2 tens and 9* ONES. Be sure to make the shift from **more** to **ones.**

Repeat both kinds of activities until they can work quickly and accurately.

page 143 Help them with the first problem. Watch for those who have trouble. When correcting, disagree at least once so that they will have to prove it with ten-trays and counters.

Have the children put down their heads and close their eyes.

You'll have to listen carefully to play this game. I have 3 tens and this many more. Tap 3 times. *What's my number?* Everyone answers. Hopefully, they'll all say 33. Listen for those who make mistakes. Continue with other numbers.

Variation: Have a contest between girls and boys—for girls only, for boys only. Award a point if everyone answers correctly.

lesson Pages 144, 145

goal Recording the number of tens and ones

memo "Place-value chart" sounds kind of formal. You may want to call this a "show me" chart.

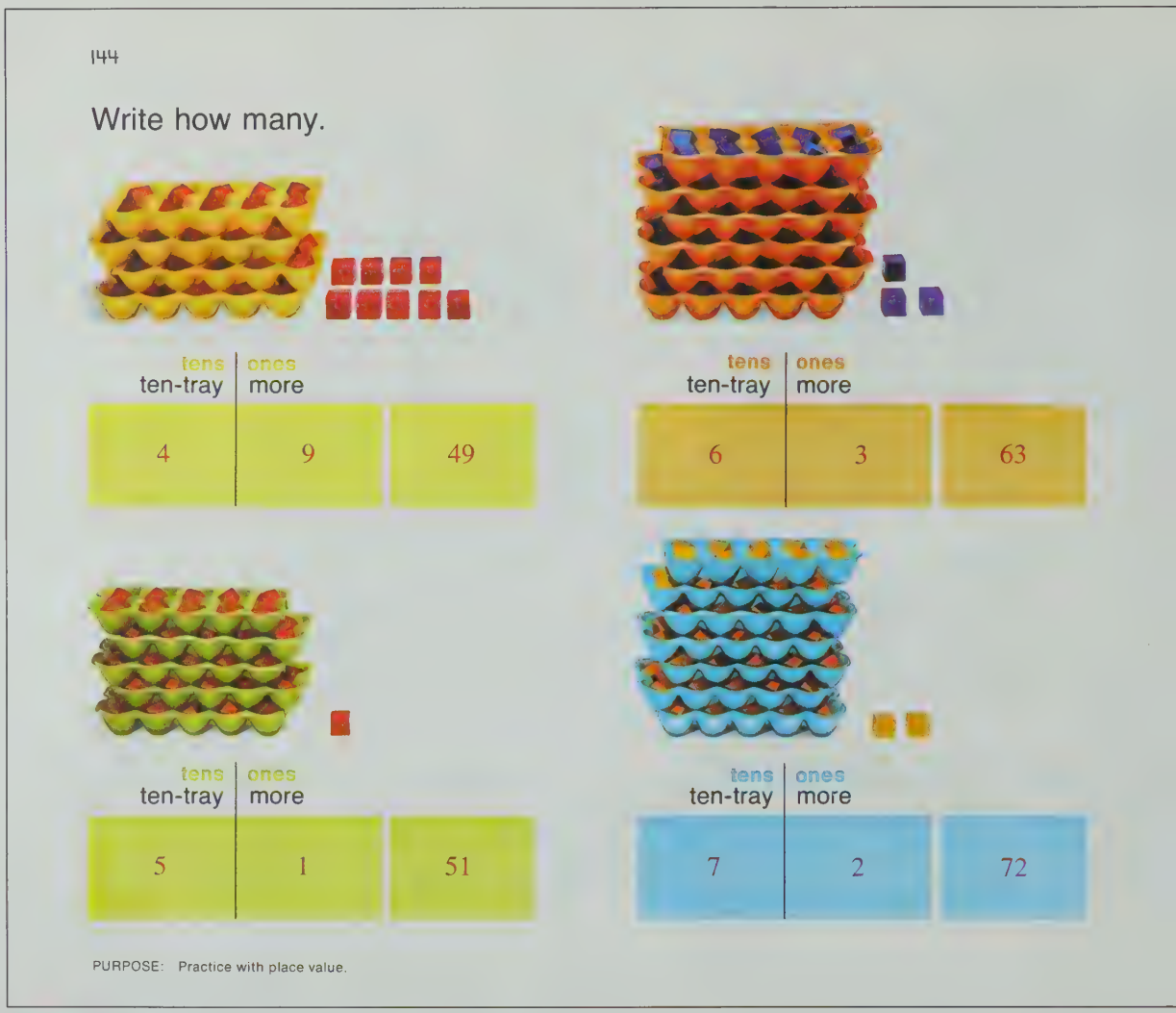
things 7 full ten-trays, 6 extra counters for each pupil:
place-value chart
numeral cards

warm-up Display 4 full trays and 3 more. Stack the full trays.

Show me how many in your charts. Read how many. What does the 4 mean? What does the 3 mean?

Continue with the trays and counters. Display 54, 25, and 36. Stop using the trays. Ask them to show the number that has 8 tens and 7 ones. Have the number read. Continue with a few more. Watch for any child who is having trouble.

page 144 Directions should be no problem. It's independent work. Is anyone having trouble? Have him use real ten-trays and count out the answers.



things for each pupil: 10 index cards, gummed dots, ten-cards (activity, page 135)

On the first card the pupil will put 1 dot, on the second card, 2 dots, continuing until he has a set of dot cards for zero through nine. The children use their ten-cards together with the dot cards to show various 2-digit numbers.

name _____

Complete.

51 means 5 tens and 1 more

79 means 7 tens and 9 more

35 means 3 tens and 5 more

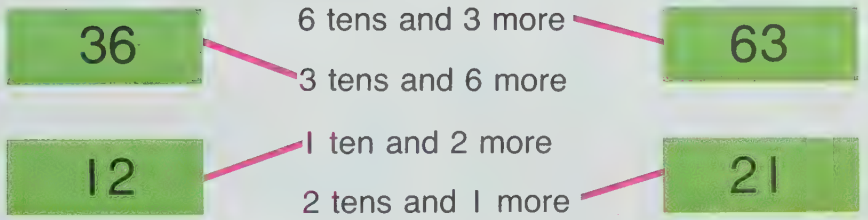
13 means 1 ten and 3 more

28 means 2 tens and 8 more

47 means 4 tens and 7 more

84 means 8 tens and 4 more

Match.



© 1974, SRA PURPOSE: Practice with place value.

goal Telling the number of tens and how many more in a 2-digit numeral

memo This page looks easy, but be prepared for trouble. The child is asked to think the reverse of what he has been doing.

take it slow & easy

things for each pupil:
ten-trays and counters

warm-up Write 54 on the board. *If you had your ten-trays and counters, what would you show me for this number?* (5 full trays and 4 more) Write 39. *What would you show me for this number?* (3 full trays and 9 more)

If answers show confidence, try several more before you go to the page. If the children are insecure, get out the trays and counters again and let them use the real things to answer your questions.

page 145 Begin together. Disagree at least once and have the answer proven with trays and counters. You decide whether they can complete the page on their own.

things for each pupil: 4 x 4 grid, counters

Write 16 different numerals on the board. Call out one number at a time. The children are to write it in a square—any square—on their game board. Be sure to say, for example, "2 tens and 2 more" as you point to 22. When the grids are filled in, the game begins. Call the numbers in mixed order. You can make a mark over each as you say it to keep track. Each child puts a counter on that numeral on his board. The first child to cover 4 numerals across a row or down a column says, "Four and no more" and wins.

lesson Pages 146, 147

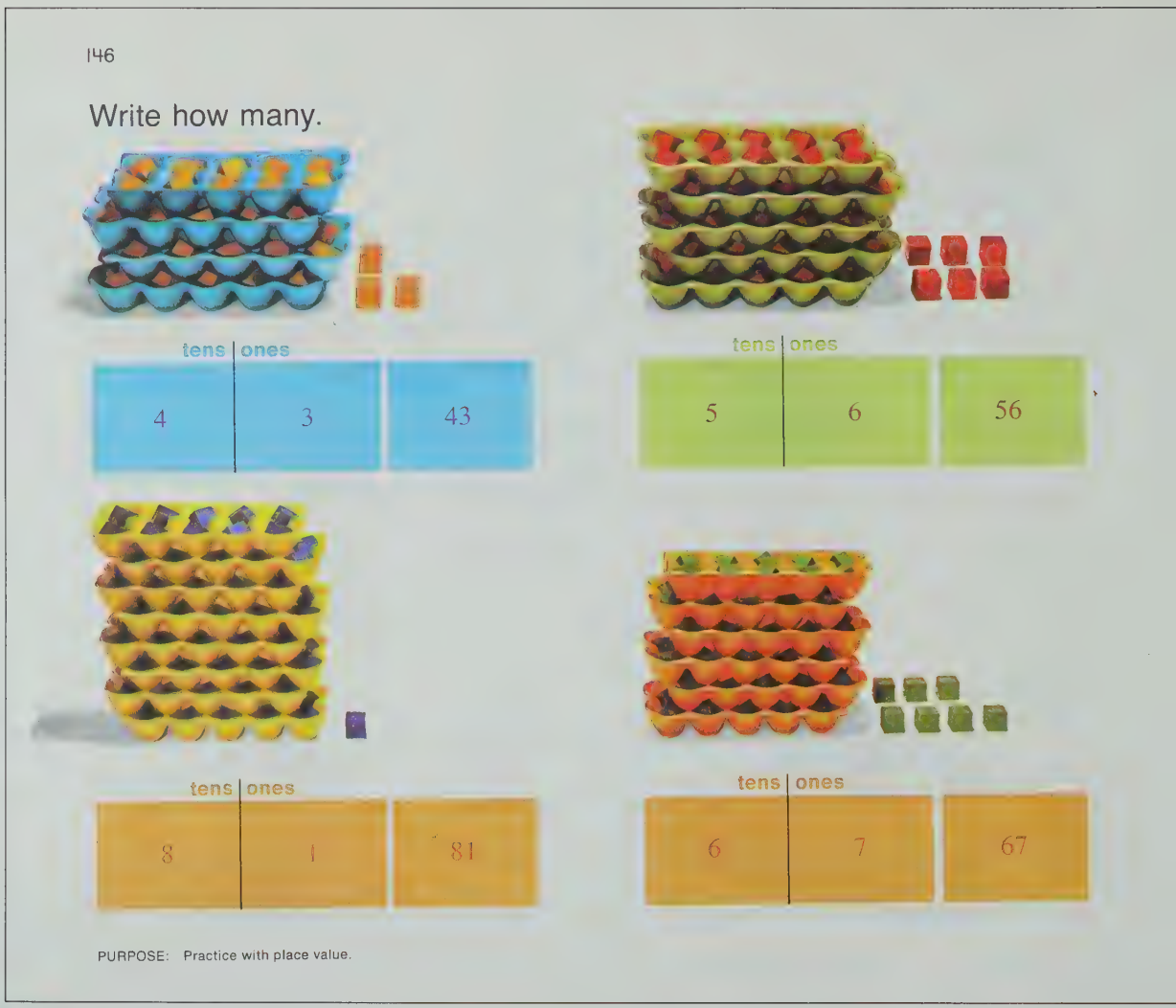
goal Recording the number of tens and ones

things ten-trays, counters
for each pupil:
place-value chart
numeral cards

warm-up Show 3 tens, 3 ones with trays and counters.

How many? Show me in your chart. Hold up your charts when you finish so I can see your answer. Note those children who look around before they complete their answer. Work with them later. Have the children explain their number. Continue until they appear secure.

page 146 *What are you to do on this page?* When directions are clear, children work independently.



things for each pupil: dot cards (activities, pages 135 and 144), numeral cards, place-value chart

Have the child show 43 below his place-value chart using dot cards. *How many tens?* Have him put the numeral 4 in the tens place. *How many ones?* Repeat the action. *4 tens, 3 ones—that's what number?* Continue with other 2-digit numbers.

name _____

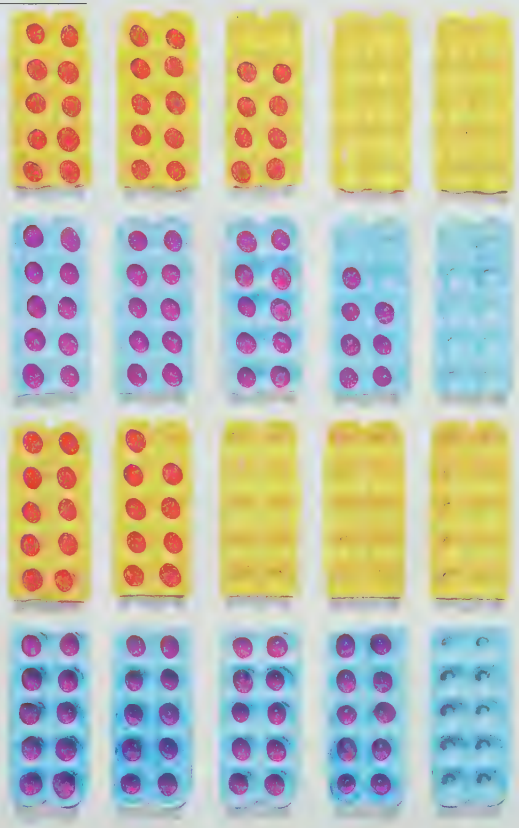
Fill the ten-trays with the given number.

tens	ones
2	8

tens	ones
3	7

tens	ones
1	9

tens	ones
4	0



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PURPOSE: Practice with place value.

goal Showing how many tens and ones are represented by a 2-digit numeral

page 147 Read the direction sentence together

What does that mean? What is a GIVEN NUMBER? *Where do you find it? How will you fill the ten-trays? This game needs one rule. A ten-tray must be completely full before you use the next one.*

As soon as directions are clear, children work independently.

things for each group: game board, 2 beanbags

Tape the game board to the floor. Write the tens in red, the ones in blue. A player tosses 1 bag, then the other. If the bags land on red 4 and blue 2, the score is 42. Each player records his score. High score wins.

tens	ones
6	6
5	5
4	4
3	3
2	2
1	1

lesson Page 148

goal Writing one-more with 2-digit numerals

things 3 ten-trays
30 counters
for each pupil:
place-value chart
numeral cards

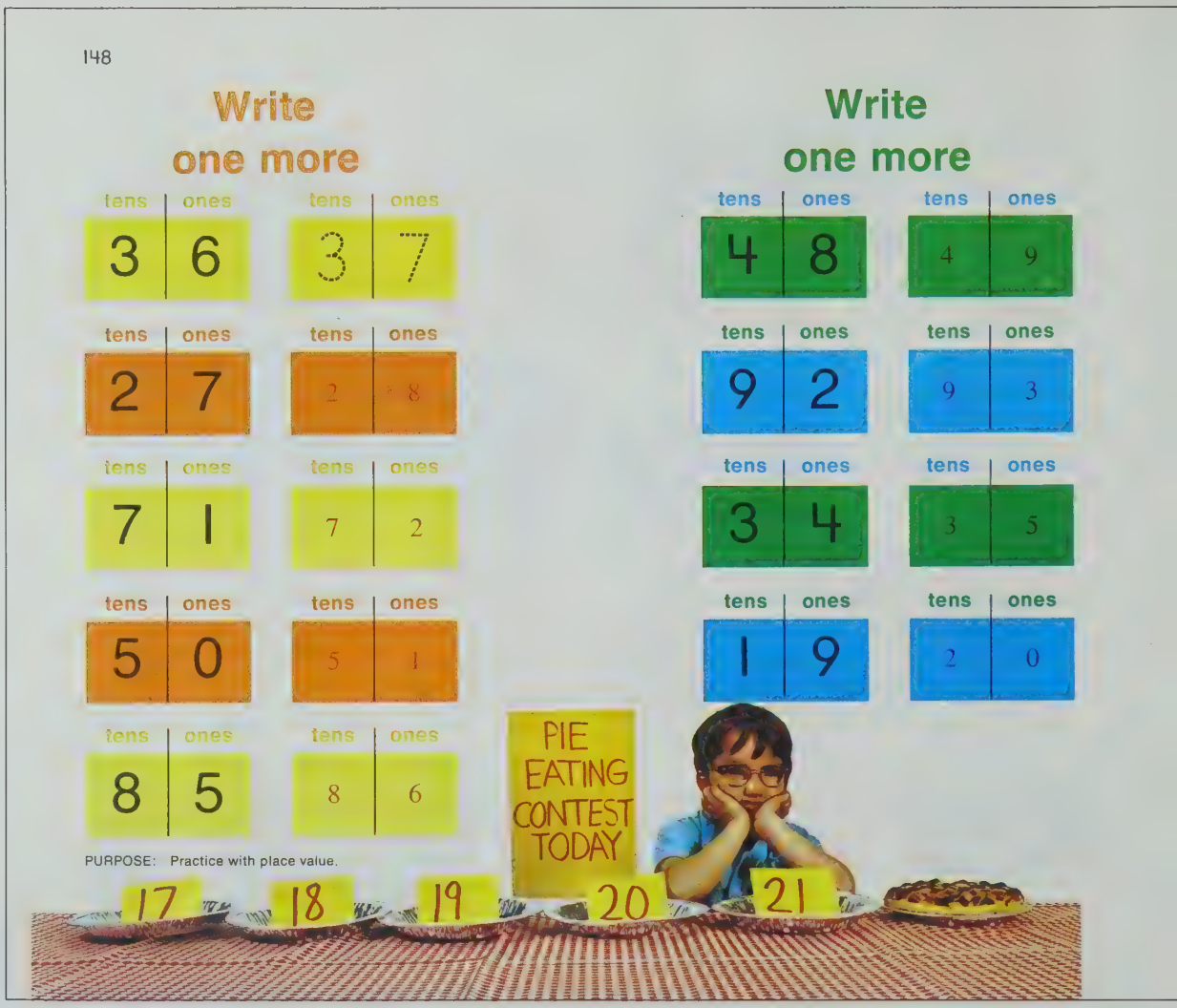
warm-up Display 2 full trays and 4 more.

Show how many in your charts. What does the 2 mean? What does the 4 mean? Add one more counter. *Now show how many. What did this one counter do to your number?*

Ask questions as above for the numbers 15, 30, and 29. Look out for that last one!

page 148 Review the directions and the first problem. This is independent work. Give help where needed.

After checking the page, look at the picture. *How many pies has the boy eaten? And one more! How many is that?*



name _____

Write what is missing.

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99
100	?	?	?	?	?	?	?	?	?

© 1974, SRA PURPOSE: Counting to 100.

After all the hard work, why not uncramp the muscles by being jumping jacks? Children stand, arms at sides, feet together.

Count of one: Jump—spread feet and clap hands over head.
Count of two: Jump—feet together and arms return to sides.

Begin slowly, then increase speed. Continue as long as they and you can survive.

lesson Pages 149, 150

goal Writing 0 to 100

memo Take one page a day, please.

warm-up Try a round robin, counting by ones to 100. The first child begins "one," the next child "two," and so on, around the room. More practice needed? Have a contest between the boys and girls.

page 149 *What's missing on this page? Don't rush. Do a good job writing your numerals.*

Children work independently. Discuss the results. Here are some suggestions. Bet you can think of more.

1. Read all the numbers in the first column. How are they alike? different?
2. Read all the numbers in the second row. How are they alike? different?
3. Find 33. How many tens? ones?
4. Find the number with 4 tens, 3 ones.
5. What's the smallest number? the largest number?
6. How many tens is 100?
7. What comes before 34? after 39?
8. Count by tens from 4.
9. Count backward from 25.
10. Do you think there are numbers that could be in place of the question marks? (Please don't ask the pupils to write them now.)

goal Writing 0 to 100

warm-up Divide the class—boys on one side, girls on the other. Alternate counting 0 to 100. Begin with the girls. Switch. Begin with the boys and try again.

page 150 Proceed as with page 149. Discuss these results as well.

Review counting by tens (0, 10, 20, and so on). Have the pupils color the column any color they wish.

150

Complete.

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99
100	?	?	?	?	?	?	?	?	?

PURPOSE: Counting by ones.

things 10 wires of beads (activity, page 84)

One hundred! Wow! That's a lot! Show just how much it is with 10 wires of beads. Practice counting by tens until 10 tens have been counted.

151

name _____

Show 30 ● in the trays.

Show 51 ● in the trays.

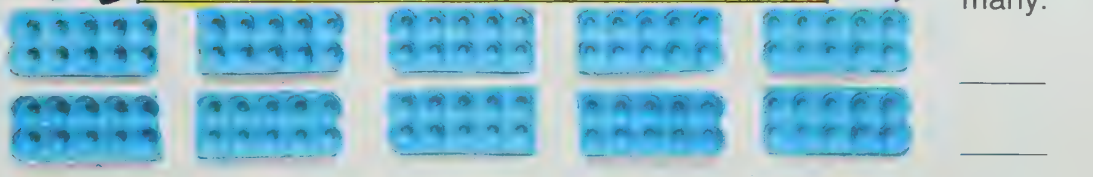
Show 13 ● in the trays.

Your turn. Show some number of ●

Tell how many.

_____

_____



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PURPOSE: Checkout—place value.

things ten-trays, counters

Provide additional practice with the real things.

See activity, page 153a.

lesson Page 151

goal **Checkout**—place value with 2-digit numerals

things crayons

page 151 This should be a fun page. Let's not mention testing. Discuss directions. The colors are shown, so reading should be no problem. This is independent work.

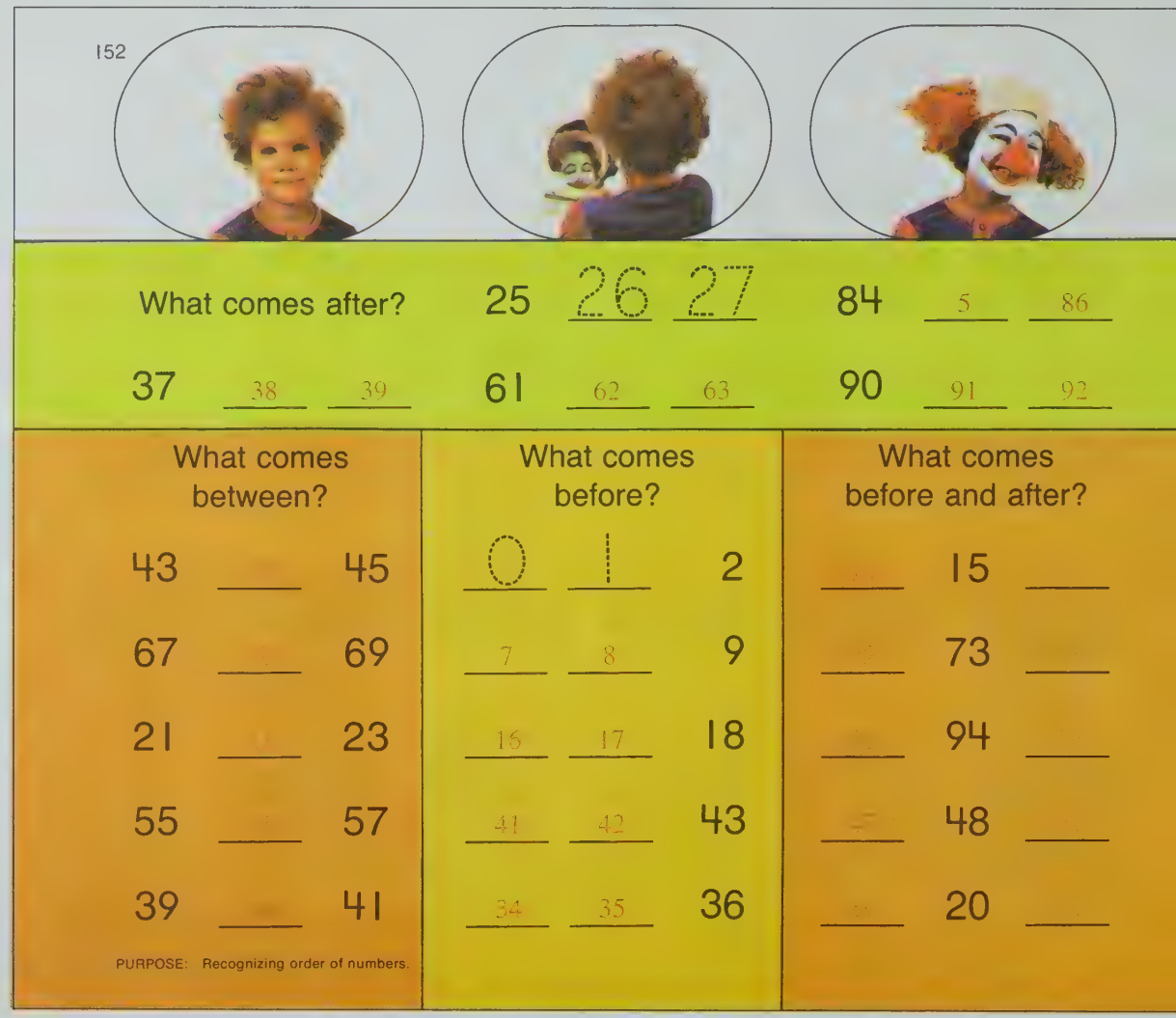
lesson Pages 152, 153

goal Number order—before, after, between

warm-up Play the I'm-Thinking-of-a-Number game.

I'm thinking of a number that is right ***after*** *10. Now I'm thinking of a number just* ***before*** *9. What number is* ***between*** *6 and 8? This is really hard. Now I'm thinking of two numbers. One number comes just before 8 and the other number comes just after 8.*

page 152 Help with reading the directions. Watch for any child having trouble with this page. Can he reply aloud? His problem then is one of writing place value. Provide additional practice—first with a place-value chart, then with writing.



153

name _____

Make an arrow point to the smaller number.

25 ← 26	100 → 99	30 ← 40
34 → 33	37 → 17	75 → 65
56 → 55	3 ← 30	90 → 89
1 ← 5	55 ← 66	0 ← 1
20 → 10	15 → 14	91 ← 99
55 ← 65	66 → 65	10 → 1
78 ← 80	38 → 37	33 → 22
	10 → 6	

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PURPOSE: Recognizing size relation of numbers.

goal Recognizing the relation of two numbers

warm-up Select several children to draw an arrow on the board. The arrows may be very fancy. In that case, ask for just the part with the sharp point. Next, draw some straight lines and let the children put on the sharp point of the arrow. Finally, write 1 _____ 2.

Make the arrow point to the smaller number. (1 ← 2)

Watch for confusion. The focus is on quantity, not on the size of the written numeral. Practice until the children can do it quickly.

page 153 *What do the words at the top of the page mean?*

Have the children work independently. Do not accept sloppy arrow points. As you have already guessed, this is a lead-in to the "greater than" and "less than" symbols.

RESOURCES

another form of evaluation

for checkout—page 151

Why not use 20 bundles of sticks or toothpicks and lots of pretend? Pretend each stick is a rolled-up dollar bill. Ten dollars are bundled together because you had planned to get them exchanged for a ten-dollar bill, but you just hadn't had time to go to the bank. Let the pupil have all that money and pretend he is going to buy things from you. You have a wagon for $24, a bike for $52, an electric train for $34, a canoe for $78, a tent for $47. Put the items on a price-tag card. Which of these things can he pay you for? (No fair opening a charge account.)

activities

things for each pupil: 1 cube numbered 0 through 5, 1 cube, numbered 4 through 9, 10 counters

Pair pupils. Each player takes 2 cubes, one of each type. He rolls his cubes and forms the largest number possible with the sides that land faceup. Example: One rolls 2 and 9. He can form 92. The other rolls 0 and 4. He forms 40.

The one with the larger number takes a counter. When all the counters are gone, the one who has more counters wins.

additional learning aids

concept—chapter objectives 1 and 2

SRA products

Mathematics Involvement Program, SRA (1971)
Cards: 261, 92, 262, 272, 123, 163, 353
Skill through Patterns, level 1, SRA (1974)
Spirit masters: 27, 28
Visual Approach to Mathematics, level 1, SRA (1967)
Visual: 11

other learning aids (described on page 256g)—100 Number Board, Unifix (cubes and components)

notation—chapter objectives 3 and 4

other learning aids—Magic slates

letter to parents

Dear Parents,

We are going to call a short time out from number study and explore some ideas of length and weight. We won't be using rulers to actually measure a length, but we will be figuring out what things are taller or longer than your child. This sort of comparison is a necessary first step to actual measuring, which will come later. We won't use a scale to weigh anything either, but we will have lots of experience with holding two objects and deciding which is heavier.

Now you have two types of questions that you can ask: "Are you taller than the chair? the table? the mailbox?" "Which is heavier—the letter or the package? the quart of milk or the loaf of bread? the pencil or the book?"

Isn't it great to be on the questioning rather than the answering end for a change?

The next number study will focus on subtraction. We will be talking about taking a number of objects away from another number of objects. We will just be exploring the idea of subtraction and do not want to rush into the memorizing of subtraction combinations. We have reserved that for later. You can provide situations where subtraction is used, however. For example, if there are nine cookies on the plate and five are taken away, there shouldn't be any problem in counting how many remain.

Thanks again.

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7 CONCEPT OF MEASUREMENT

before this chapter the pupil has—

1. Examined the size and shape of real objects
2. Found the set that has more, less, most, least

in chapter 7 the pupil is—

1. Developing the concept of measure
2. Comparing lengths: taller, tallest, longer, same
3. Developing the concept of weight
4. Comparing weights

in later chapters the pupil will—

1. Identify the longer or shorter of two objects with different lengths
2. Find the number of whole units of length of an object with an appropriate unit of length
3. Identify the heavier or the lighter of two objects

Notes & Things

Measurement is one of the most frequently used ideas in elementary school mathematics. It can be one of the most horrible things to teach or one of the most glorious. Get ready for the glorious. Take time out to think how many times you have been in a measurement situation during the past week. Did you buy anything new? Was size, weight, or length involved? Did you step on a bathroom scale? Did you count calories? Did you buy groceries or cook a meal? Is there a clock in your life? Did you listen to the weather forecast?

Measurement is a practical area of study. This chapter is limited to exploring the concept of length and the concept of weight. You don't need a ruler or a scale, however. The children will be personally involved every step of the way. The height or length of something will be related to the child's height or length. (It may come as a shock to some to find that the measurement of their height is the same as the measurement of their length.)

And weight will be a comparison of two objects that you can hold—one in each hand. The goal will be to get the feeling of weight—the feeling of one object that is heavier than another object.

It is always interesting to find out how good adults are with their basic concepts. Have you tested yourself? Hold your fingers about 24 inches apart. Now measure. Lift a book and write down what you think it weighs. Now weigh it. How good are you at estimating measurement? This will probably depend on the amount of practice you have had. The purpose of this chapter is to give the learner practice long before standard units of measure are introduced.

words

New concept-development words are listed in order. Those used on the pupil page are marked with an *.

taller*	longest
tallest	shorter*
measure	length
longer*	weigh

things

Each child must have a piece of yarn or heavy string that is the same length as he is. Have a yarn-holder helper who will position one end of the yarn so that it touches the floor. Then you can cut a length of yarn that is the same length as the child as he stands against the wall. This piece of yarn will let each child compare his own height with other lengths being measured.

If you have lots of extra yarn, it is an interesting experiment to let each child cut off a length that he thinks is as long as he is tall. This will give you some early information about each child's perception of length.

No other special things are needed for this chapter.

This chapter is different from many of the others. Hands-on experiences and a lot of activities are necessary before the child can really understand the major concepts of length and weight. As a result a unique checkout of skills will also be needed. Standard evaluation techniques simply won't determine the extent of a child's learning. This evaluation information is usually found at the end of the chapter, but you need some advanced warning this time.

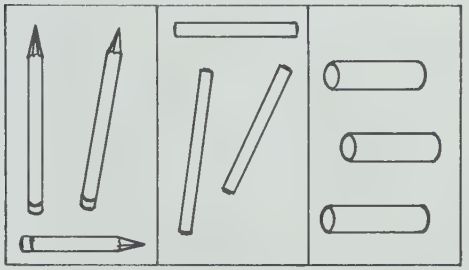
There is no way to fairly evaluate a child's knowledge of the concept of length or weight with a paper-and-pencil test.

Please use these two ideas after page 161 to help you determine whether a pupil needs more measurement activities.

checkout activity for length

You will need 3 pencils, 1 longer than the other 2 and 2 of the same length; 3 rods of 3 different lengths; 3 pieces of chalk, all about the same length; a piece of yarn.

Arrange the three sets as shown. The pupil is to find the longest thing in each set. Then have him find the shortest. The objects may not be moved, but he can use the yarn for help.



pencils **rods** **chalk**

checkout activity for weight

You will need 3 or 4 same-size cans with snap-on lids, variety of fillers (sand, flour, popped corn, dried beans)

Fill each container in a set with something different. Fill in the top with paper so that the contents cannot be seen. Label the can so that it can be identified for discussion. The sets of cans for each group need not be identical.

Have the pupil handle each of the containers. *Do they weigh the same? Are all the containers the same size? Which one weighs the most? Which one weighs the least? What could be in each container?* Let the pupil use his imagination. He need never know for sure.

Pupils who have not developed these skills need more experiences similar to those used in this checkout.

Perhaps you already have accumulated a set of activities to use when you teach the concepts of length and weight. These additional references may also be helpful.

additional learning aids

concept — chapter objectives 1 and 3

SRA products

Inquisitive Games: Exploring Number and Space, SRA (1967)
- Colored-Stick Activities: 8, 9, 10, 11, 12
- Road Games I and II
- Squares Game
- Equivalence
- Estimation I, II
- House Game
- Steps Game

Mathematics Involvement Program, SRA (1971)
- Cards: 41, 51, 171, 162, 182, 192

operation — chapter objectives 2 and 4

other learning aids (described on page 256g) — Willbrook Discovery Math Work Cards (length, weight)

lesson Page 154

goal **Survey**—child's understanding of his size in relationship to other objects

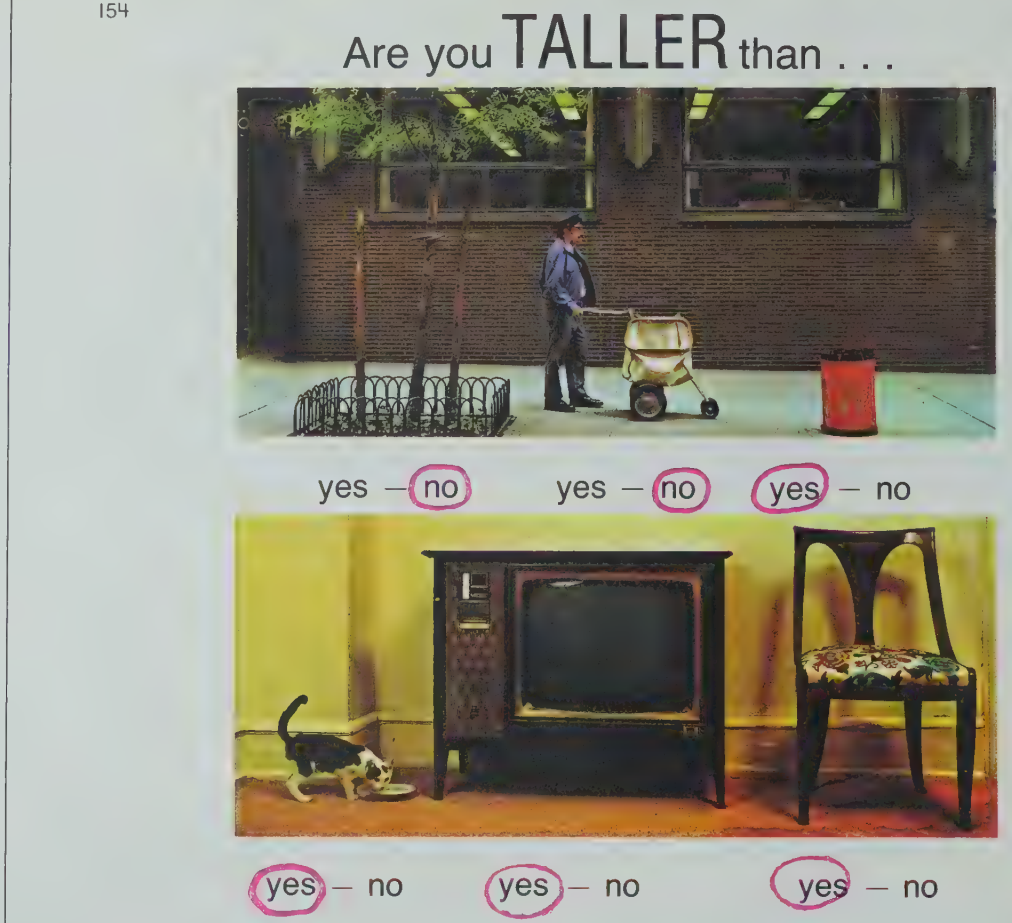
memo Comparing oneself in size to an object in a picture is not as easy as it looks. "I'm taller than that tree in the picture" is certainly true. The question must be "But are you taller than the tree outside?"

warm-up Check their understanding of TALLER and TALLEST. *Who is the tallest person in the room?* (Teacher) *How do you know?* Name two children with obvious differences in height. *Who is taller? How did you figure that out? How can we be sure?*

page 154 Discuss the picture. Relate the objects in the picture to real things in the environment. Then if there is doubt about an answer, it can be checked.

Watch for children who are unsure. They will need many comparison experiences. Tour the classroom and ask again and again if they are taller than . . . the door, chair, chalkboard, desk, window, window ledge, flowerpot, a friend.

What must you do to prove something is taller? Do they use the word MEASURE? Do they say that they should stand up straight to compare heights?



PURPOSE: Introduction to linear measure.

If you are one of the lucky teachers who has access to long, wide rolls of paper, there is nothing more exciting than having the pupils trace one another. (It would be fun for you too to see how you look in two dimensions.) Don't let anyone use felt-tip pens for marking. Their ink is hard to get out of clothing.

name _____

Have each child draw a picture of his family, showing their relative heights. There's no need to develop frustrated artists. Stick-people will do. *Will your baby brother be as tall as your mom? Who is the tallest in your family?*

lesson Pages 155, 156

goal Comparing two lengths—taller

page 155 As you talk about all the objects in the picture, focus on which is taller: fire hydrant or stoplight, building or streetlight. Seek reasons for their answers.

Think about how you would look if you were somewhere in the picture. Would you be taller than the fire hydrant? Would you be taller than the traffic light? Would you be taller than the building? the truck? the truck tire? the door of the store? Draw a picture of yourself standing in the doorway of the building.

All evidence from the study of children's art confirms that this is a **very** hard task. If drawing frustrates any child, let him simply make a mark on the doorway to indicate about where the top of his head would be. If he still has trouble, have him stand in a classroom doorway and mark his height with tape to help him see the relationship.

goal Comparing two lengths—longer

memo Convincing a child that he is as tall as he is long is a hard job. Make sure that every child has a length of yarn that is the same as his height. (See page 153c.)

warm-up Focus on the word LONGER by comparing two real objects in your classroom. Ask which is longer. Compare another two objects. Ask which is SHORTER.

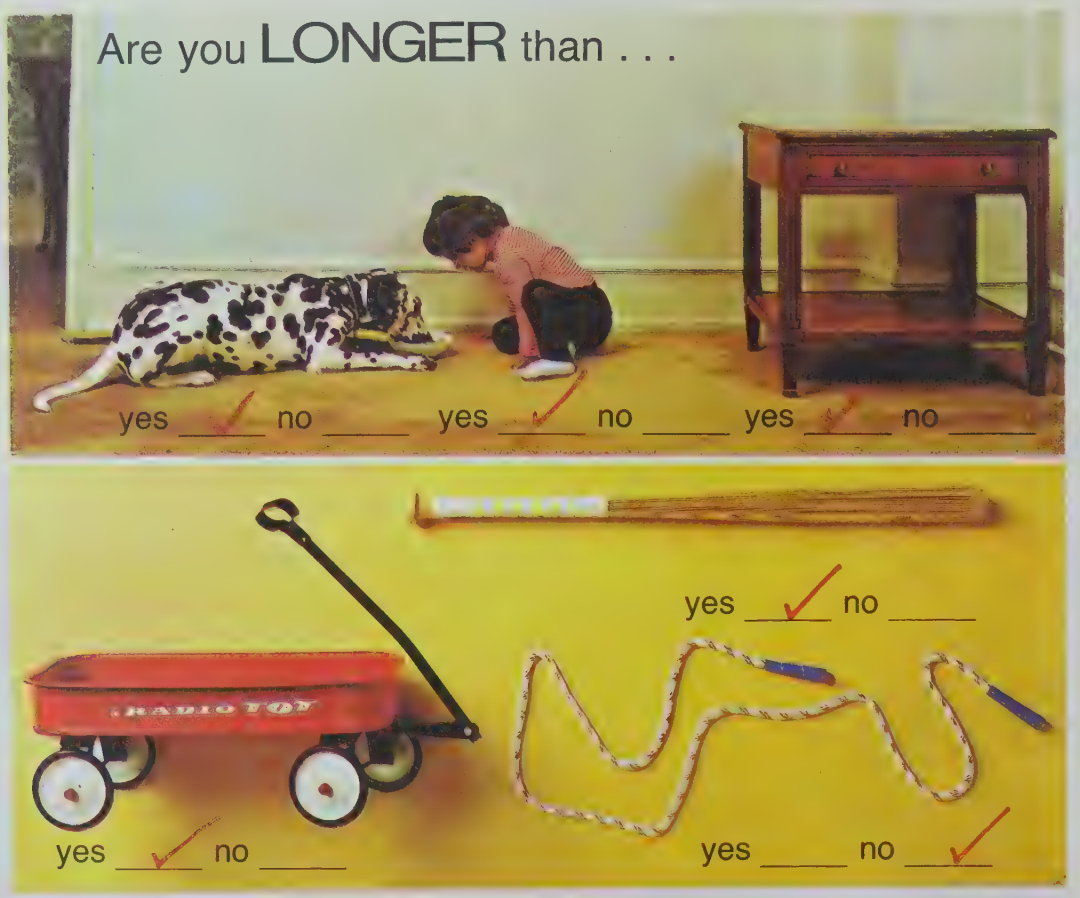
page 156 This is a do-together page. Relating an object in a photo to the real thing could again be a problem.

Have you ever seen a real dog like that? If you lay down on the floor beside that dog, would you be longer? You'll get an oral answer. Ask them to check yes or no next time rather than answer aloud. *If you lay down beside a child like the one in the picture, would you be longer?* Continue. Complete the page.

Review the group's responses. Ask if all dogs are the same length. all babies? all tables? If there is disagreement, ask how they could prove their answers. Cross your fingers—someone might use the word **measure.**

Encourage them to use a string that is the same as their height to measure all sorts of things at home (the refrigerator, big brother, the TV set, the cat). Have them report the results to the class.

156



PURPOSE: Exploring linear measure.

STOP

Have 2 children stand back to back. *Who is taller? Now who do you suppose would be longer if both were lying down on the floor?* Prove it. Feet against the wall will give the control you need to make a comparison of lengths.

Are you longer than the table? Not sure? How could you find out? Don't let the child fall off the table. You would never be able to explain that one.

157
name _____
What things can you find that are about as long as each of these bars?
Answers will vary.
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PURPOSE: Comparing lengths.

lesson Pages 157, 158, 159

goal Comparing lengths—one-to-one

page 157 Ask the question at the top of the page. Talk about some possible answers.

What will you have to do to make sure the things you find are right? I'm going to let you be detectives. Look in and around your desks. Find 1 thing that is about as long as each of the 3 bars. Put the thing you find alongside each bar.

After the children complete the search, divide the class into groups. One group visits another to observe and discuss their findings. Finally, discuss the many kinds of things that were used. Which was the most difficult bar to match and why? Be sure to allow them to use such things as a shoe, a folded tissue, as well as more predictable objects such as pencils, crayons, books.

If the children are not using the word **measure,** introduce it during this discussion.

things for each group: chalk, rubber jar ring, piece of string 8″ to 15″ long, 1″ paper squares, masking tape, lined paper, paste

Make a line on the floor with masking tape. Each child stands back of the line and tosses the ring. Gently, please! Then he makes a chalk mark inside the ring. *How many units did you toss the ring? Use your string to measure.* Record the results. Each child writes his name on a line of the paper. Immediately after his name, he pastes on 1 square for each unit of measure that he tossed the ring.

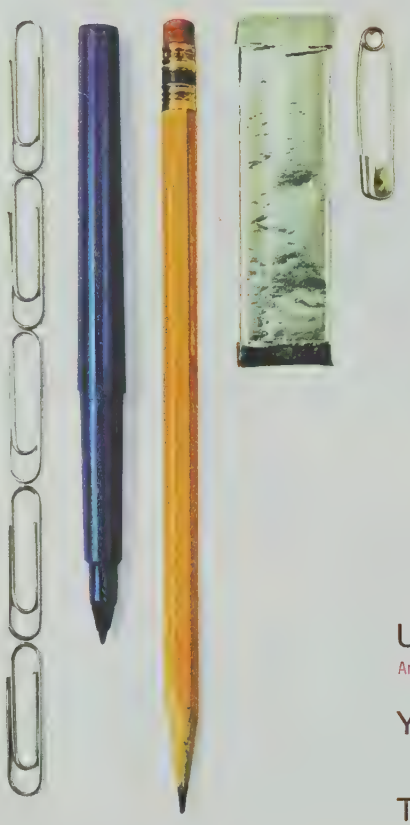
goal Comparing lengths—many-to-one

warm-up *Have you ever been with someone who bought some ribbon or rope or cloth? How did the clerk decide how much to cut? How do you know how tall you are? How could you tell how long this room is?*

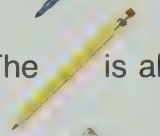
page 158 Discuss the objects pictured. Read the first sentence, substituting the words **how many** for the blank. Give no further help. Let each child work out his own method. Discuss the results. Disagree with at least one answer so that the pupils must show you how they got it.

After they mark the LONGEST object, ask how they figured that out. Then read the direction sentence for measuring with the book. Ask how that can be done. Be prepared for confusion. The notion of continuous length is a rough thing to learn when you don't have a continuous measurement device to use. If the width of a desk is about "3 books" wide, put 3 books end to end. Ask how many books. Then remove all but 1 book. Align the book with the left edge of the desk. Have the pupil mark the end of the book with his finger. Direct him to keep that finger in the same place as he moves the book with his other hand. Continue until he measures the length of 1 book, then 2 books, then 3 books. This is easier said than done!

158



The is about as long as 4

The  is about as long as 5

The is about as long as 2

The is about as long as 1

Mark the longest object.

Use the edge of your book to measure.

Answers will vary.

Your desk is about as long as _____

The window is about as long as _____

PURPOSE: Comparing lengths.

Need more practice in measuring? Try measuring the distance across the chalkboard. The eraser will serve as a unit of measure.

things for each pupil: soda straw

(Groups of 4 to 6) Job: Use a soda straw to measure the height of each group member. *Who is tallest? Who is next tallest? Who is shortest? Make a picture of your group.* Use stick-people. Try to show different heights.

name _____

Is the green crayon longer, shorter, or about the same? Same

Are the green crayons alike or different in length? Same

Are the others alike or different in length? Same

© 1974, SRA

PURPOSE: Comparing lengths.

goal Comparing objects that have the same length

things chalk and crayon that are about the same length

warm-up If the children have not been using the word LENGTH, introduce it now.

Hold the chalk and crayon next to each other. *Are these about the same* ***length?*** Hide both for a second. Display them again so that they make a corner. *Which is longer?* Hide them again. Display one end to end with the other. *Which is longer now?* The answer to these three questions will let you know what to expect on the page.

page 159 Repeat the question at the top of the page as you examine each pair. Discuss the replies. *Why do you think so? How could we prove your answer?*

Be alert for the children who think that the green crayon is longer in the second pair. They simply see it extending beyond the other crayon. Listen to their answers for the remaining pairs. If they are still having trouble, have them prove their answers by measuring with a length of string. Some may need to manipulate real objects.

STOP

things for each pupil: piece of string the length of his foot

Have the pupil use his string to measure various things in the room: his desk, the chalkboard, a bookcase, a window. Challenge him to find something that is the same length as his piece of string.

lesson Pages 160, 161

goal Comparing two weights—more

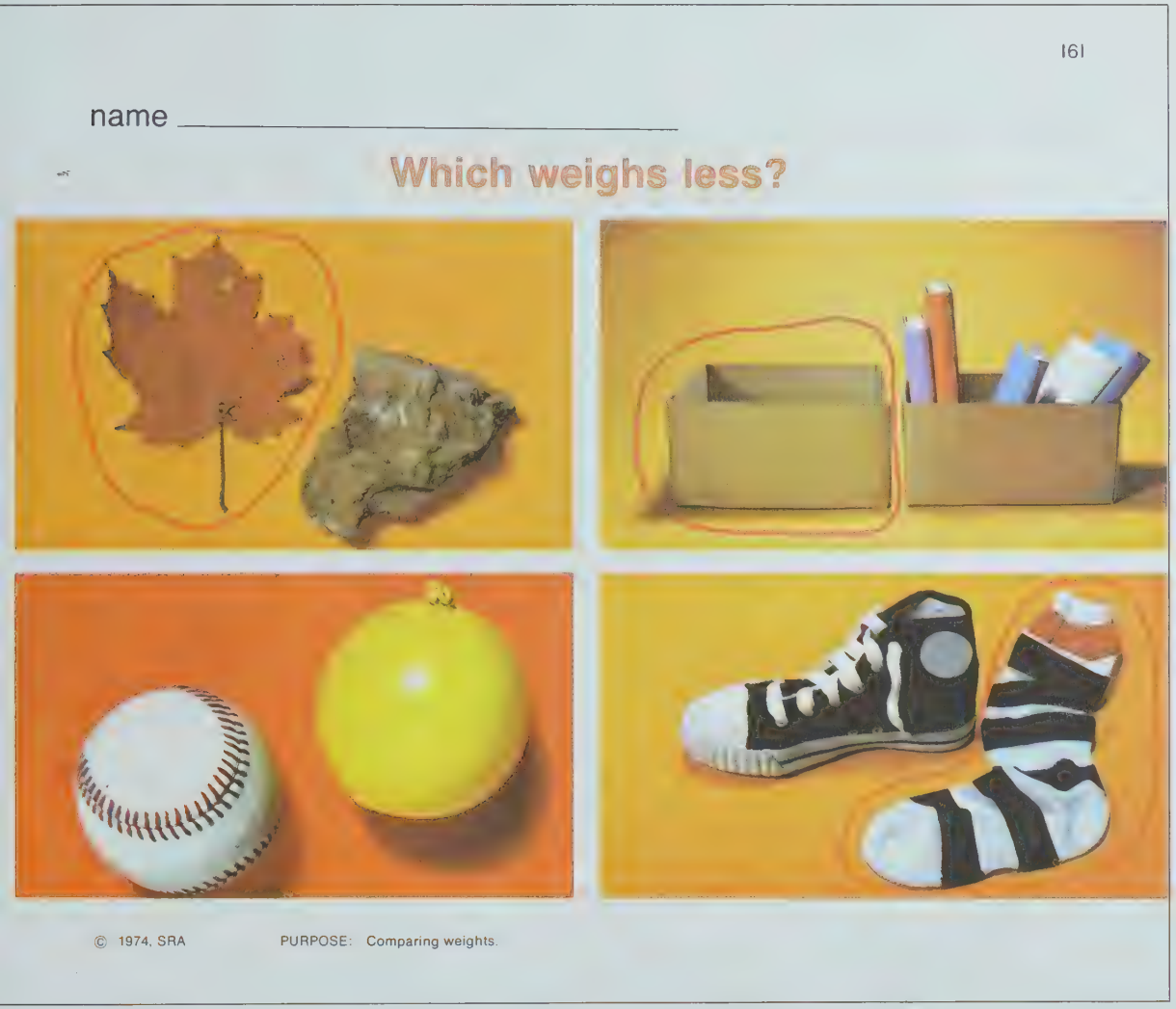
things objects of different weights that pupils can hold in one hand

warm-up *Do you know how much you* WEIGH? *How did you find that out?* If there is a scale in school, visit it and weigh some of the children.

Which weighs more, your chair or your pencil? Continue with classroom objects. Hold one in each hand. Ask the same questions about a paper clip and a chalk eraser, a pencil and a book.

Provide actual hands-on experience for all pupils. Keep on comparing objects as long as the children are interested. This may be a new experience for them. Make sure everyone is involved.

page 160 Ask the question at the top of the page for each pair. The children are to mark the picture of the real thing that weighs more. Always ask why they answered as they did. Continue with activities that let each child feel the weight of one object in one hand in comparison with another, heavier object in the other hand.



goal Comparing two weights—less

things string
box of crayons
pencil
notebook
piece of paper
objects shown on page

warm-up *Which weighs less, a worm or a wagon? Why do you think so?* Continue with classroom objects. Hold one in each hand. Ask the same questions about string vs. box of crayons, pencil vs. notebook, piece of paper vs. book, and so on, as long as they are interested. Remember that hands-on experience is important for everyone.

page 161 Proceed as for page 160. Be sure to ask children why they answered as they did. Again, use real objects when possible to settle any disagreements.

8 CONCEPT OF SUBTRACTION

before this chapter the pupil has—

1. Counted sets of zero through eighteen and recorded how many
2. Ordered the numbers 0 through 18
3. Practiced addition facts with sums through 10

in chapter 8 the pupil is—

1. Developing the concept of subtraction
2. Using the subtraction symbol
3. Practicing subtraction with numbers less than 10
4. Solving subtraction word problems
5. Using the horizontal and vertical forms for subtraction
6. Relating subtraction to addition
7. Finding other names for a number

in later chapters the pupil will—

Say or write the difference for any subtraction fact (in level 2)

Notes & Things

The concept of subtraction is presented by itself. Subtraction's relationship to addition is explored toward the end of the chapter and is presented as a way to check to make sure the operation of subtraction was done correctly. There is no work with a missing addend in this chapter.

The action of taking away some number of objects from a given number of objects is the single approach used to introduce the concept and its notation. This development parallels the development of the addition concept. First there is time to look at the action of taking away. Continued practice with counting how many there were to start with and then counting the number taken away allows the introduction of the minus symbol to replace the English words *take away*. Finding out how many remain is the last step in building the subtraction sentence.

As soon as the vertical form is introduced, you have your signal that exploration of the concept has been completed and now practice is in order. Mastery of the subtraction facts is not expected at this level, but nearly all the pupils should be confidently subtracting two 1-digit numbers.

Taking away some number and then putting it back may start out to be bit of magic. Your guidance is needed to point out that this is one way to check that the subtraction has been done correctly.

words

New concept-development words are listed in the order in which they are orally introduced. Words also appearing on pupil pages are marked with an *

- take away*
- minus
- remain*
- subtract*
- subtraction sentence
- different name for the same number

things

counters
+, −, = symbol cards
numeral cards
flannel board and felt pieces or overhead projector
wood beads, heavy string, and clothespin

lesson Pages 162, 163

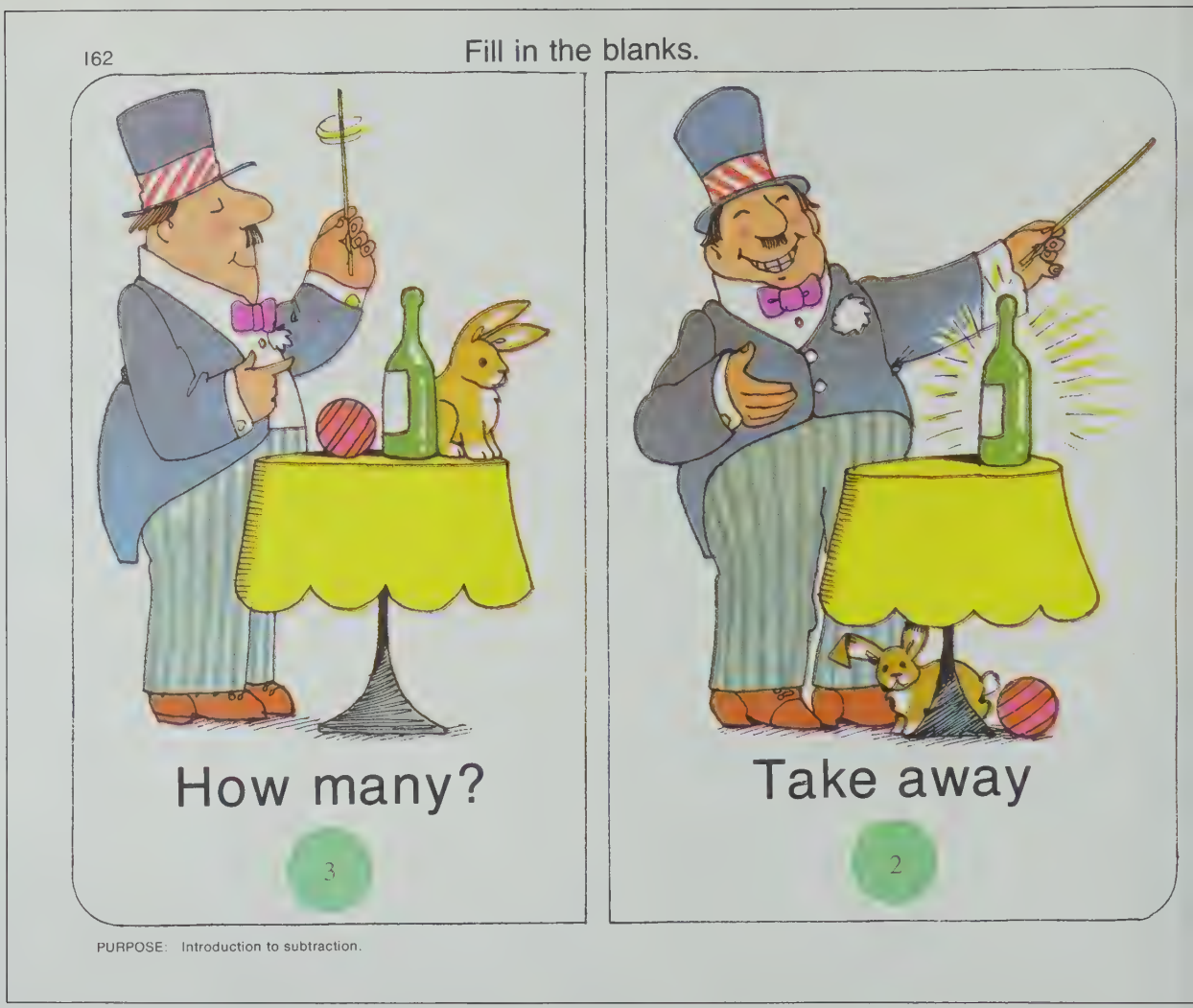
goal **Survey**—understanding of take away

page 162 *My, what a fancy-looking man! Is he a clown? What is he doing in the first picture? What is on the table? What trick might he do with the rabbit? the bottle? the ball?*

How many objects are on the table? Have the children fill in the blank. Now look at the second picture, and then fill in the blank.

Continue to check for understanding of TAKE AWAY with the following activity.

Put both hands on your head. Take away 1 hand. Put 3 crayons on your desk. Take away 1 crayon. Put both feet flat on the floor. Take away 1 foot.



PURPOSE: Introduction to subtraction.

name _____

Fill in the blanks.

© 1974, SRA PURPOSE: Introduction to subtraction (continued).

goal Introduction to taking away part of a set

memo Nice and easy, please. The concept of subtraction will be developed for several pages before the children complete a subtraction sentence. This is the time for lots of discussion and storytelling.

page 163 Discuss each pair of sets.

What is in the first row? How many are there? Children fill in the blank. *Look at the second row. What is that rabbit doing? How many candles did he take away?* Children fill in the blank. *What told you that he took away just 1 candle?*

Look at the next problem. What do you see in the top row? Write how many. How many flowers is the rabbit taking away? Write your answer on the line next to the words ***take away.***

Continue and complete the page.

lesson Pages 164, 165, 166

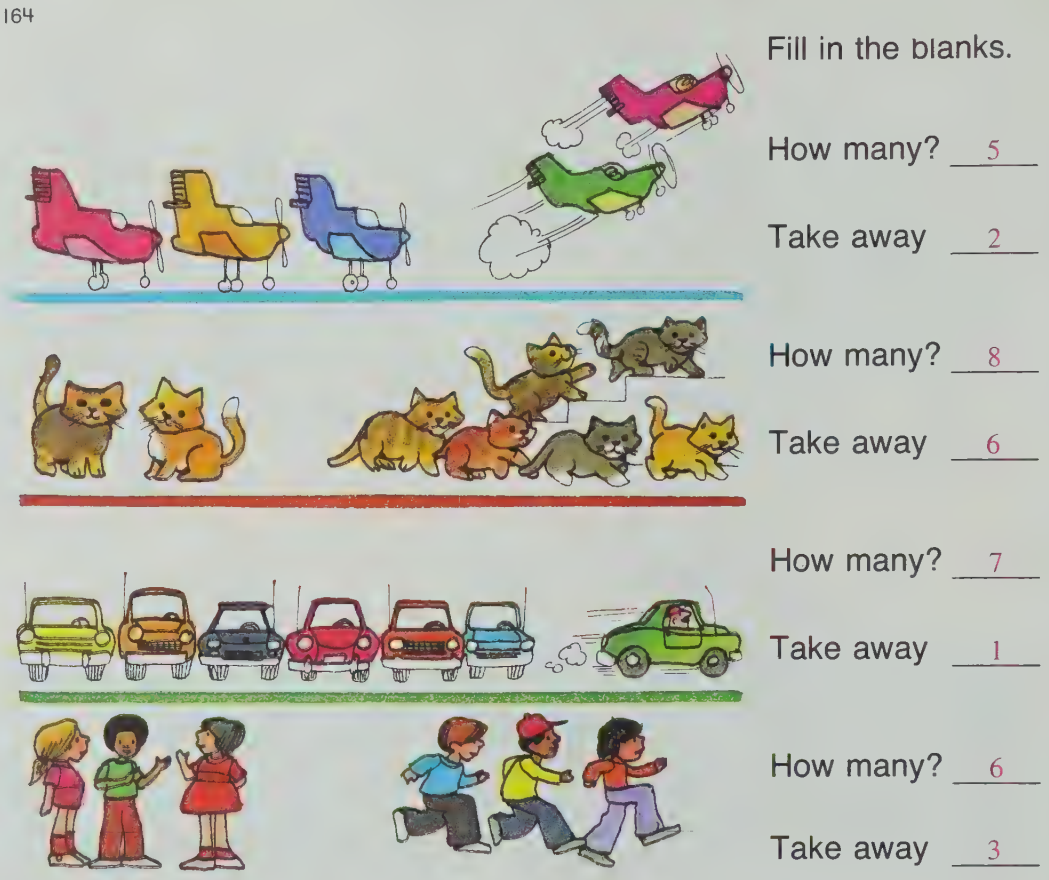
goal Development of the meaning of subtraction

page 164 Look at each illustration. Have the children count how many. Watch the answer to "How many?" Be sure that they understand this means how many in the entire set **before** any are taken away. Fill in the blank.

Decide how the action of subtraction is shown. Ring the objects that are going away. You might want to have the pupils draw an arrow to make the going away more dramatic.

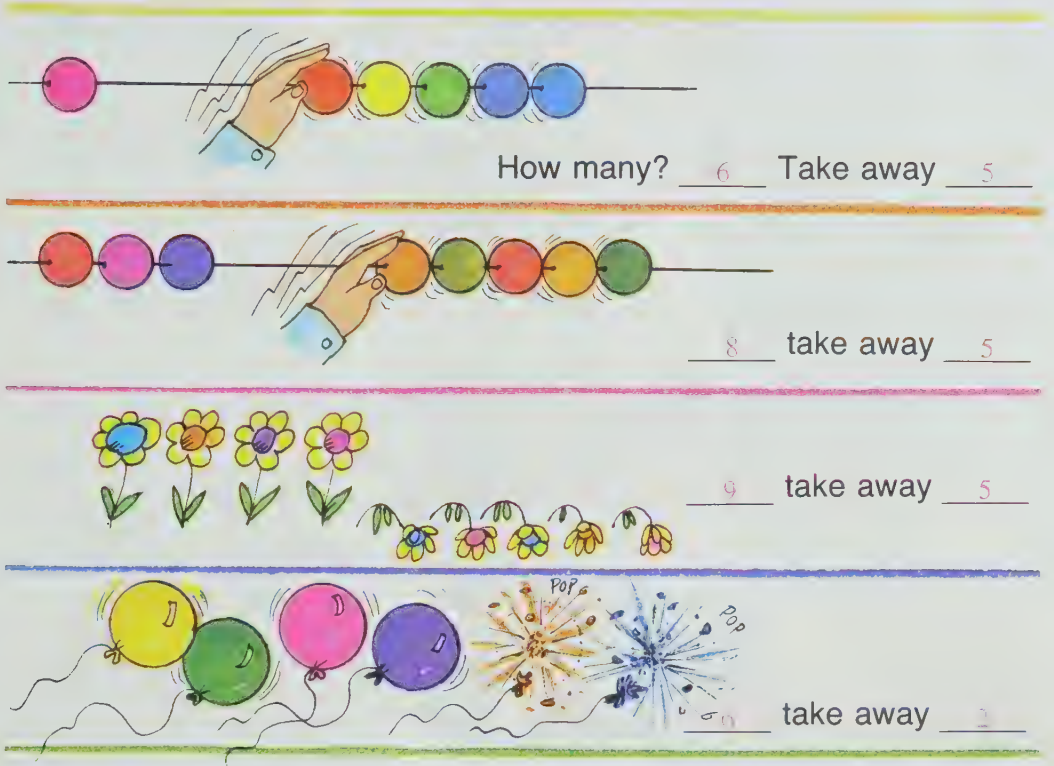
X X X (X X) ↗

Count the objects in the ring. Fill in the second blank.



name _____

Fill in the blanks.



© 1974, SRA PURPOSE: Introduction to subtraction (continued).

goal Introduction to another subtraction model: ___ take away ___

things for each pupil: counters

warm-up Write on the board:
How many? _____ take away _____

With your counters, show a set of five. Take away 2. Push them to the side.

Fill in the blanks. Repeat with a second example. Before beginning the third example, write on the board:
_____ take away _____

Show a set of four. Take away 2. How can we write what happened, using these blanks? Complete the last model.

Don't be discouraged if this takes some doing. Try to get the answer from the pupils. Use other examples until they understand.

page 165 Discuss the first picture.

What's happening? How many beads were there before someone started pushing? Where will you write that? How many did he take away? Where will you write that?

Continue to ask questions until replies indicate that they are secure. Let them try the other one by themselves. Again count how many; then discuss the action. Ring the number taken away for the last 2 illustrations only if helpful to the pupils. Relate this subtraction to the real world.

goal Introduction to the subtraction symbol, –

things flannel board and felt pieces for each pupil:
– and numeral cards

warm-up Show a set of three on the flannel board. Move 2 objects. On the chalkboard, write

___ take away ___

Have a child fill in the blanks.

We have another new math sign today. Erase **take away** as you talk. *Its name is* MINUS. Write –. *Now what does this say?* (3 **minus** 2)

Distribute the minus-sign cards. Show a set of four on the flannel board. Show one taken away.

Use your numerals and the new sign to show what happened. What is the sign called? What did you write with your cards? Record on the board. *Let's read this together.* Continue until the children work easily.

page 166 The Warm-up should have prepared them for the page. Discuss how the take-away action is shown. As the children work independently, remind them to begin by counting all the children in each set. If a ring around the number taken away is helpful, let them use it.

When checking, ask—but do not have them write—how many are still in line.

166

Fill in the blanks.

7 – 5

9 – 3

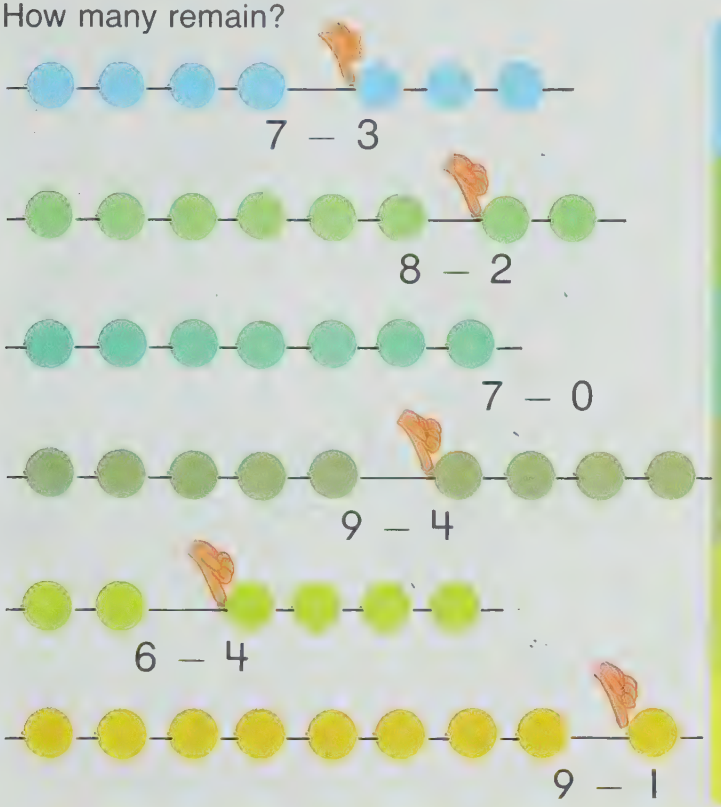
8 – 7

6 – 4

PURPOSE: Introduction to the subtraction symbol, –

name _____

How many remain?



3	4	2
6	4	8
0	7	6
5	4	3
4	5	2
1	8	9

© 1974, SRA PURPOSE: Readiness for subtraction.

lesson Pages 167, 168, 169

goal Finding how many remain

things flannel board and felt pieces for each pupil: counters

warm-up Show 4 objects on the flannel board. Move 2 away.

How many did I begin with? How many did I take away? How many REMAIN? *That word* ***remain*** *is a new word.* Write the word on the board. *What does that word mean?*

Get out your counters. You can show me that you know what the new word means. Show a set of six. Take away 4. How many remain?

Continue with more examples until the children show you that they understand.

page 167 Read the question at the top of the page.

Do the children remember how to mark their answers? If not, remind them to ring the numeral that tells how many remain.

goal Getting ready for the subtraction sentence

things for each pupil: counters

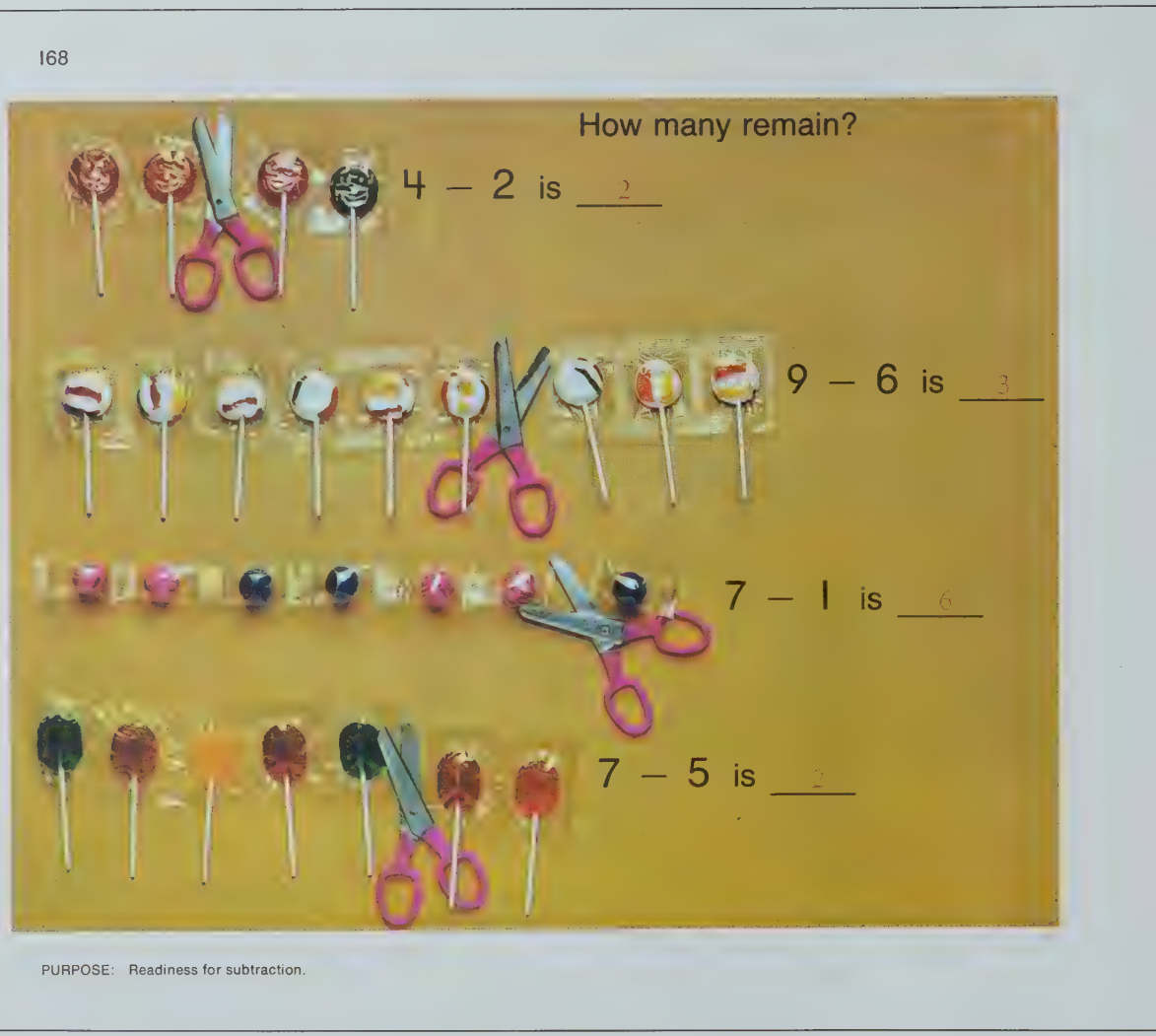
warm-up Write on the board: How many remain? Have the question read. Under it write: 5 − 1

Use your counters. How many do you begin with? How many do you take away? How many remain? As the answer is given, complete the sentence on the board: is 4

Have a child read the sentence.
(5 minus 1 is 4)
Repeat with 6 − 2, 7 − 4, 8 − 3.

page 168 *What's the question for this page? How will you do the page?*

When checking, disagree once so the children must prove the answer.

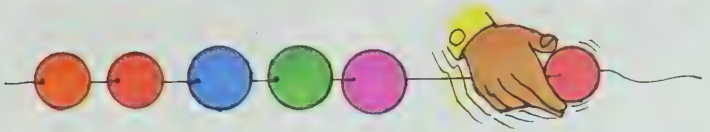


169

name _____

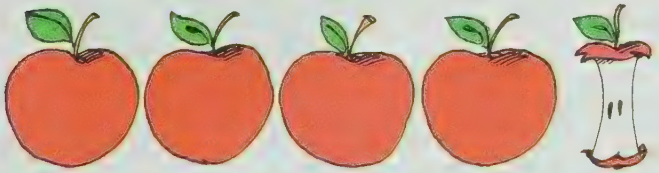
How many remain?

8 − 4 = 4



6 − 1 = 5

9 − 8 = 1



5 − 1 = 4

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PURPOSE: Introduction to subtraction sentences.

goal Introduction to the subtraction sentence

things for each pupil:
−, =, and numeral cards

warm-up *Remember this sign?* Write = on the board. *What's its name?* Write on the board: 3 − 1 = _____ *Everybody use your fingers. How many to begin with? Why 3? What does the minus sign tell you to do?* (Take away) *How many? Do it. How many remain? Where does that number go? Let's all read what we have now.* 3 minus 1 equals 2.)

Show all 5 fingers. Slowly lower 2 fingers. *Use your numeral cards and signs to show what happened. Let's all read the sentence together.* Continue until children can quickly form sentences.

page 169 *What's the question at the top of the page? What are you to do on the page? How will you do it?*

Check completed work by having each sentence read. Go back and have those in trouble ring the number that are taken away in each problem.

lesson Page 170

goal Practice in subtracting from numbers less than 10

things counters

page 170 Discuss and complete the examples at the top. This is their first experience with nonillustrated subtraction sentences and the word SUBTRACT. Counters are O.K. to help with answers. You may want to do the first column together.

After checking, have the pupils use counters with the sentences they missed. Which sentence was missed by the greatest number of children? Put it on a list for additional study. Practice it throughout the day.

Subtract

7 – 4 = 3	8 – 4 = 4	
8 – 3 = 5	8 – 7 = 1	9 – 6 = 3
6 – 5 = 1	9 – 5 = 4	7 – 7 = 0
7 – 2 = 5	8 – 5 = 3	6 – 6 = 0
9 – 8 = 1	9 – 3 = 6	4 – 3 = 1

PURPOSE: Subtraction practice.

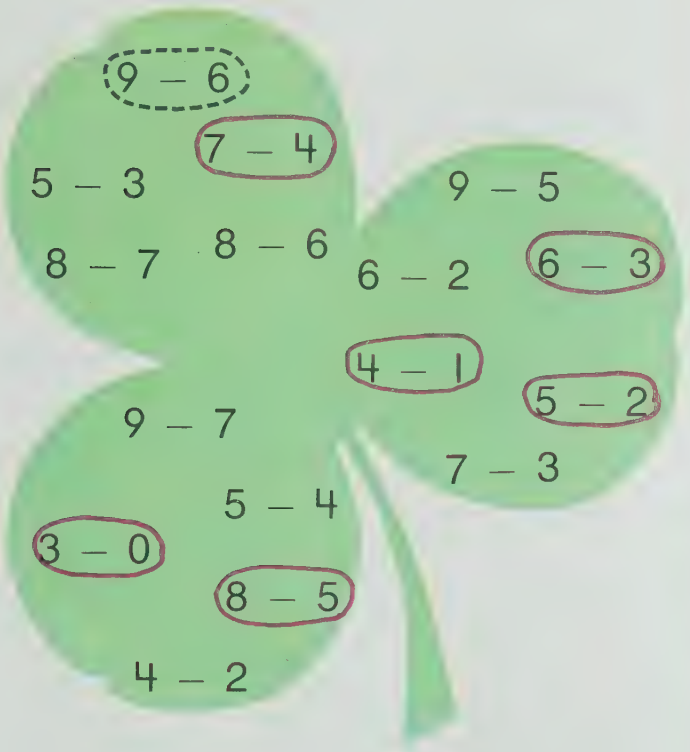
things dot cards (activity, page 77), colored acetate (to cover half of card)

Display the card in a horizontal position. *How many in all?* Cover the set of three. *How many subtracted?*

How many remain?
More capable pupils write the matching subtraction sentence.

name _____

Ring names for 3.



Subtract 5.	
8	3
6	1
9	4
5	0
7	2

Subtract 4.	
5	1
9	5
6	2
8	4
4	0

© 1974, SRA PURPOSE: Subtraction practice.

things strips of pegboard cut with various numbers of holes, 2 colors of golf tees to serve as pegs

To find the addition names for six, use a strip with 6 holes. Show 1 red peg, 5 green pegs; 2 red pegs, 4 green pegs; and 3 red pegs, 3 green pegs.

See activity 1, page 186a.

lesson Page 171

goal Practice in subtracting from numbers less than 10

warm-up Discuss the various names a person may have. Use yourself as an example. You're called teacher, that's for sure! But what else are you called? Bring nicknames of the children into the discussion. *Robert Jones could be called Bob, Bobby, Rob, Mr. Jones, Master Jones, son, brother—lots of names.*

We're going to play a name game with our numbers. What's 4 + 2? 4 + 2 is a NAME *for 6. What's 3 + 3? 3 + 3 is another name for 6. What's 7 − 1? Gee, that's another name for 6. What's another name for 6? Let's see how many names we can think of.*

Carry on with names for 1 and for 4.

page 171 Careful! Do the clover together, unless the children really understand and show they can work independently. Then tackle the right side of the page. Make sure the pupils understand that they must subtract the number at the top of the table from every number in the table. These mental arithmetic problems may be easier than you expect. If not, you can always use counters to form the number in the table and repeat again and again the instructions to **subtract 5.**

lesson Page 172

goal Practice in subtracting from numbers less than 10

things counters

page 172 Encourage the use of counters for those children who are not working confidently.

When correcting Mike's paper, have several of the mistakes proven with counters. See if the children can tell you what Mike did wrong.

SUBTRACT

9 − 9 = 0

8 − 5 = 3

7 − 1 = 6

6 − 5 = 1

7 − 3 = 4

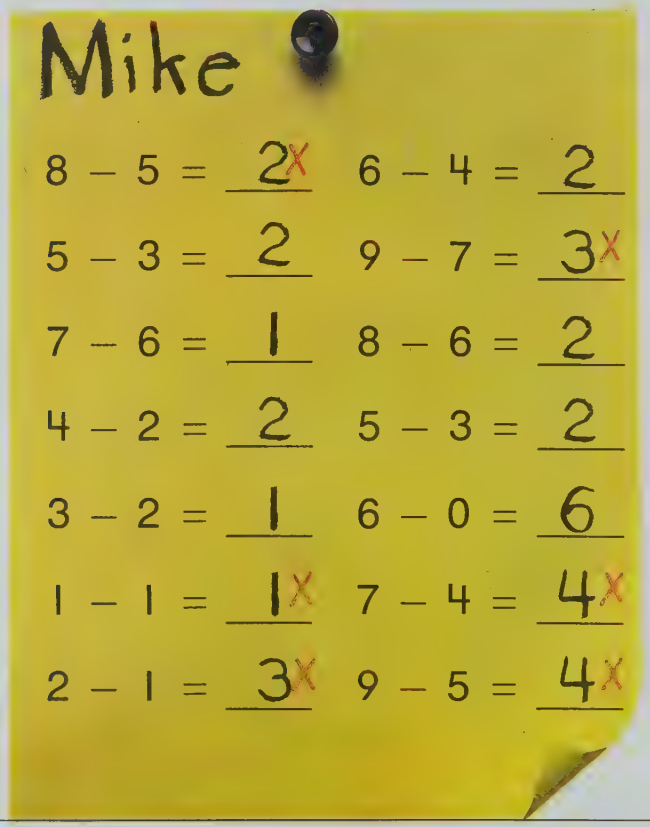
9 − 2 = 7

6 − 4 = 2

9 − 4 = 5

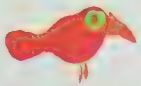
PURPOSE: Subtraction practice.

Correct Mike's paper.
Use X to show a mistake.



name _____

There were 7
4 flew away.
How many remain?



3

There were 7.
5 went away.
How many remain?

2

There were 6.
3 went away.
How many remain?

3

I had 4.
I gave away 1.
How many remain?

3

You had 9
You lost 3.
How many remain?

6

There were 3.
2 went away.
How many remain?

1

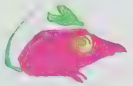
There were 5.
2 went away.
How many remain?

3

You had 8
You gave away 2.
How many remain?

6

There were 8
5 went away.
How many remain?



3

© 1974, SRA PURPOSE: Subtraction practice

Put your authors to work. Now you can put some subtraction word problems in the collection.

Challenge those who have a good understanding of subtraction to tell you the number sentences for happenings in the classroom. For example, Billy passes out books to a reading group. *Billy, how many books to start with? How many did you hand out? How many remain? Can you tell me a number sentence that would show that?*

lesson Pages 173, 174

goal Solving subtraction word problems

page 173 Read the first three word problems together. Don't let reading stand in the way of success with math. Give all the help necessary, but let independent readers be on their own. Use counters to prove an answer is correct.

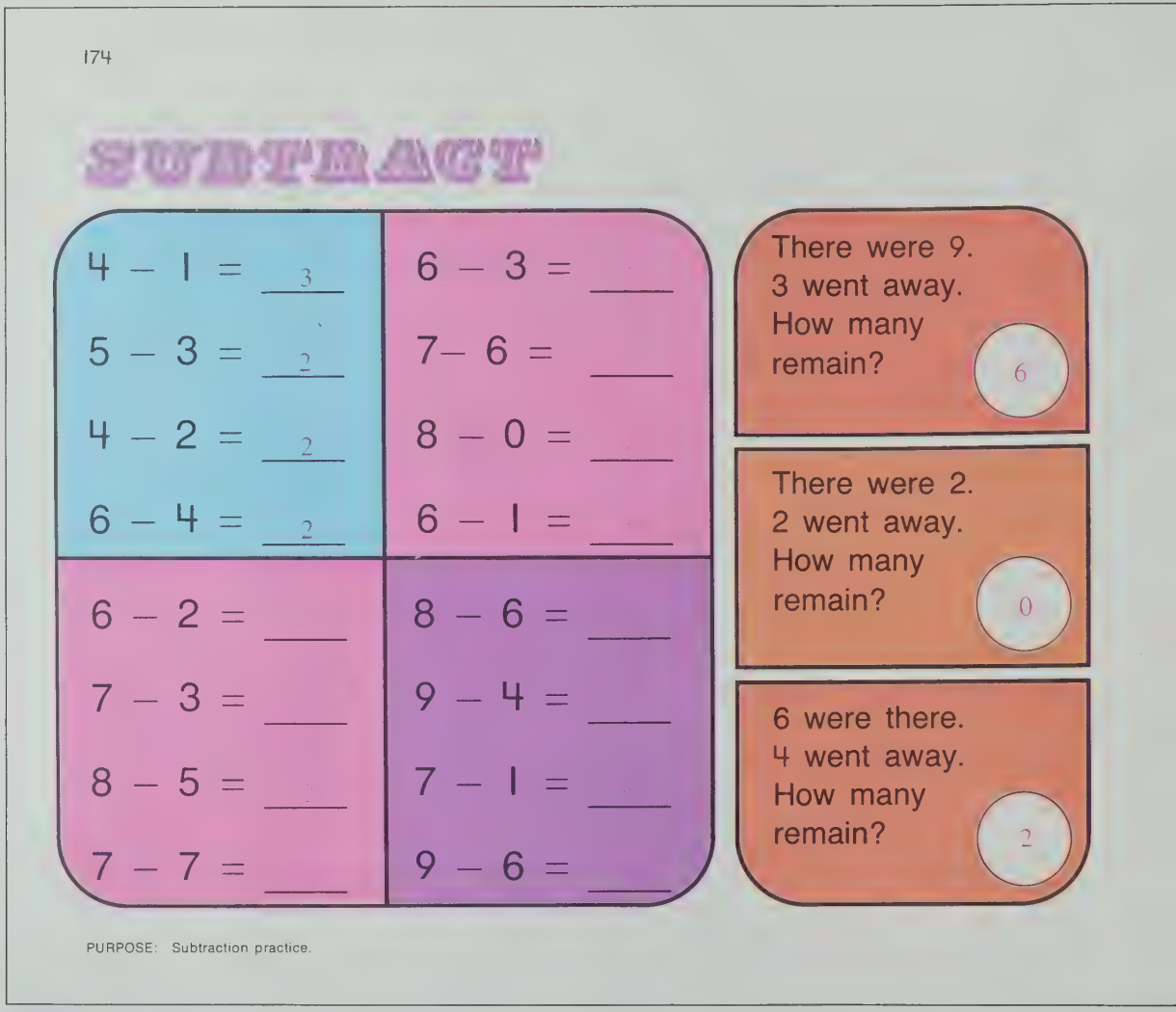
The children may want to put in the art for those problems that have none. When correcting the page, have them share ideas about what they think the problems were all about.

goal Practice in subtracting from numbers less than 10

things counters, if necessary

page 174 Do not expect speed at this point in the development. Counters are O.K. The children should work independently. Have each child use counters to rework problems he missed. Pair pupils for additional practice before the progress check on page 175.

You know how best to handle the word problems with your class.


174
SUBTRACT
4 − 1 = 3
5 − 3 = 2
4 − 2 = 2
6 − 4 = 2
6 − 3 = ____
7 − 6 = ____
8 − 0 = ____
6 − 1 = ____
6 − 2 = ____
7 − 3 = ____
8 − 5 = ____
7 − 7 = ____
8 − 6 = ____
9 − 4 = ____
7 − 1 = ____
9 − 6 = ____
There were 9. 3 went away. How many remain? 6
There were 2. 2 went away. How many remain? 0
6 were there. 4 went away. How many remain? 2
PURPOSE: Subtraction practice.

things flip cards (activity 2, page 128a)

Ready to use these cards for subtraction? Remember—**always** begin with zero. Let's find 3 − 2, as an example. The number to the left of the minus sign says flip forward 3 times, counting as the strips are flipped. See the 3? Now flip backward 2 times, counting 1, 2. See the 1? That's the answer!

The development in the book goes only through subtracting from 9. You may want to remove the teen numbers from the rings or challenge the **very capable** by extending subtraction.

name _____

SUBTRACT

3 − 2 = ____	5 − 3 = ____
4 − 0 = ____	7 − 4 = ____
5 − 1 = ____	6 − 5 = ____
4 − 4 = ____	5 − 0 = ____
6 − 4 = ____	9 − 3 = ____
7 − 3 = ____	8 − 4 = ____
7 − 7 = ____	7 − 5 = ____
4 − 2 = ____	9 − 5 = ____

There were 9. 8 went away. How many remain? 1

There were 6. 6 went away. How many remain? 0

There were 7. 2 went away. How many remain? 5

© 1974, SRA PURPOSE: Progress check – subtraction.

things for each pair of pupils: wood cube numbered 0 through 5, counters

The first pupil chooses a number from 6 through 9. The second pupil rolls the cube and subtracts the number that lands faceup from the first pupil's number. Pupils alternate.

Have a capable pupil work with each pair of pupils working on the practice activity. This youngster serves as referee and awards one counter for each correct answer.

lesson Pages 175, 176

goal **Progress check** – subtracting from numbers less than 10

things counters, if necessary

page 175 Boxes of the same color have problems of equal difficulty. The last box contains the most difficult facts. Assign it only to the most capable children. Do not push for speed. No fair sleeping either! Counters are O.K. The emphasis is on what subtraction means and on how to find the answer.

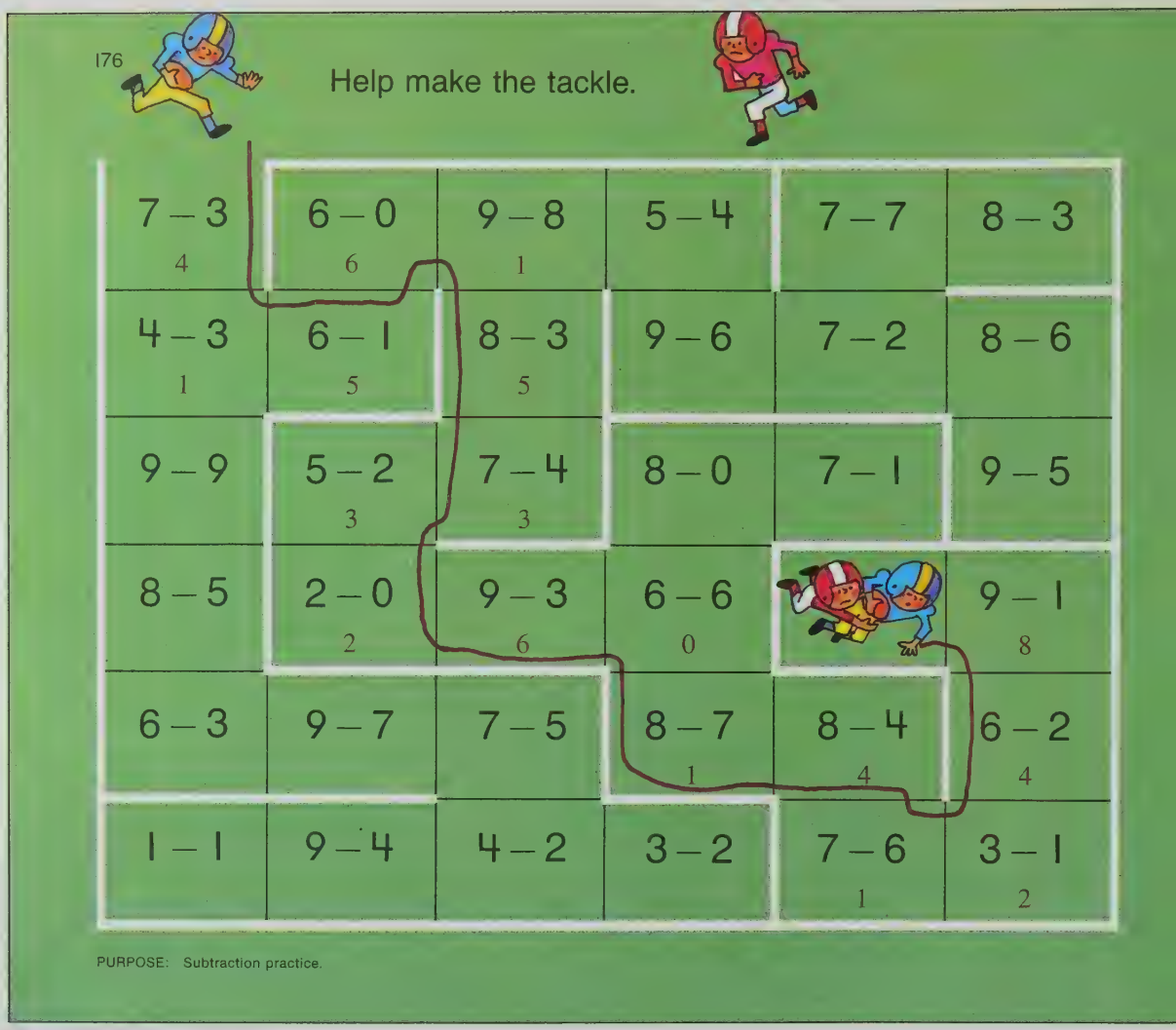
goal Practice in subtracting from numbers less than 10

memo You may want to use this page with those children who can operate independently (with or without counters), while you work individually with any who are really struggling.

things counters, if necessary

page 176 *Do you remember how to do this kind of page? What happens when you come to a wall? Do you do all the problems? Which ones?* (Problems on the path to get through the maze)

Have them lightly color the path. Then let them work independently.



name _____

Subtract

3 – 3 =	0	7 – 6 =	1
5 – 2 =	3	7 – 5 =	2
4 – 1 =	3	6 – 4 =	2
4 – 3 =	1	7 – 1 =	6
5 – 4 =	1	8 – 5 =	3
6 – 2 =	4	9 – 7 =	2
6 – 0 =	6	9 – 2 =	7
6 – 6 =	0	7 – 3 =	4

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PURPOSE: Progress check – subtraction.

things for each pair of pupils: counters, wood cube numbered 6, 7, 7, 8, 9, 9

The first pupil chooses a number from 0 through 6. The second pupil rolls the cube and subtracts the first pupil's number from the number that lands faceup.

Have a capable pupil work with each pair of pupils working on the practice activity. This youngster serves as referee and awards one counter for each correct answer.

lesson Page 177

goal **Progress check** – subtracting from numbers less than 10

things counters, if necessary

page 177 On this page different color answer spaces divide the progress check into four sections. Problems of equal difficulty have green answer spaces. Don't pressure the children with a time limit. Two sections may be all your less-able pupils can handle – that's O.K. Understanding the operation of subtraction in order to find how many remain is still the focus. Again, the last section is the most difficult.

lesson Page 178

goal Introduction to the vertical form for subtraction

things counters

warm-up It's time to use the magic again to rewrite a subtraction sentence in vertical form for computation.

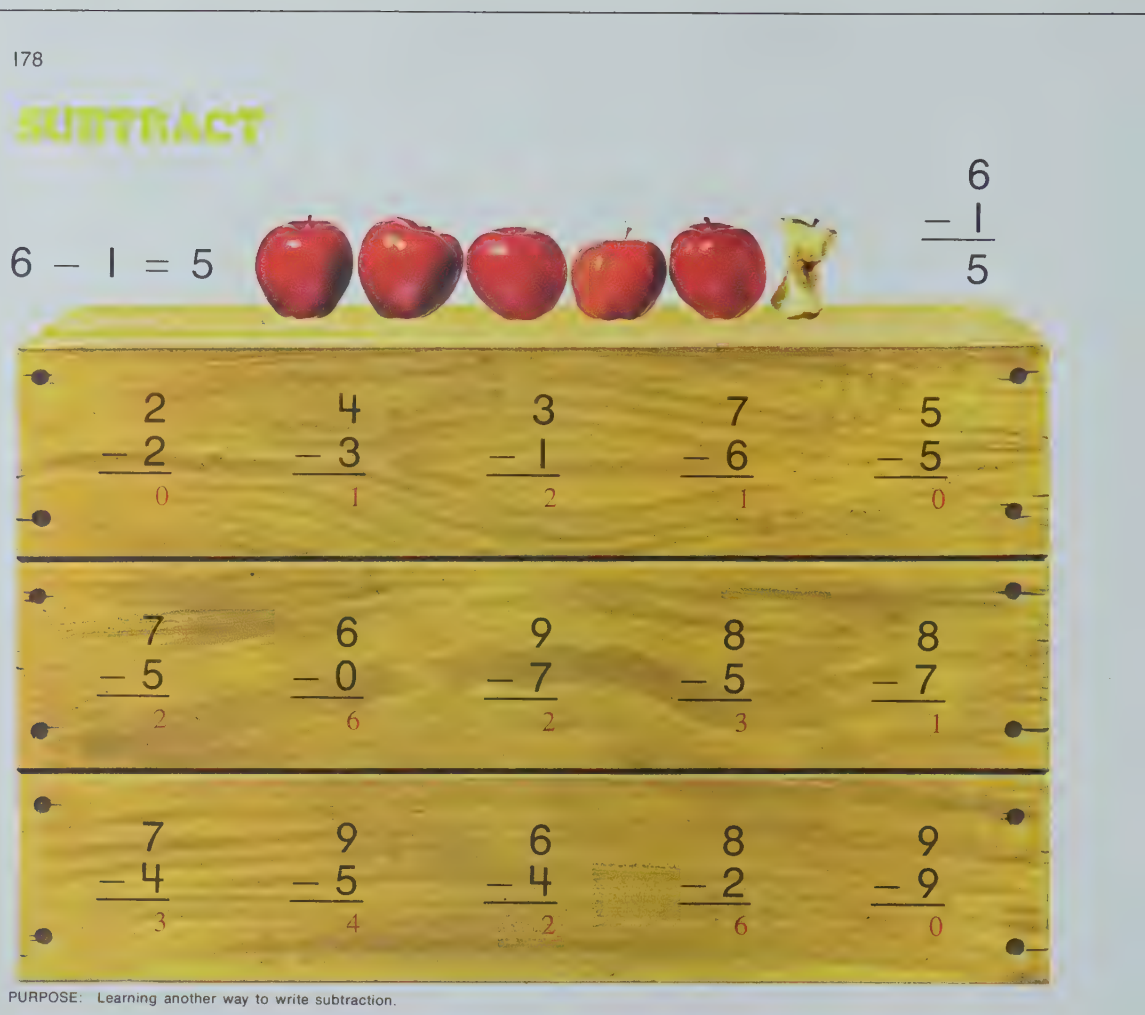
Erase the 6.
Write it over the 1.

$$6 - 1 = 5 \quad \rightarrow \quad \begin{array}{r} 6 \\ -\ 1 \\ \hline 5 \end{array}$$

Erase the equals sign.
Make the line.
Finally, move the 5.

page 178 *What happened at the top of the page?* Examine the two ways of writing the subtraction sentence. Locate each number and symbol in the two forms.

How will you finish this page? Watch where the children are writing their answers. When checking, disagree with the answers at least twice so that the pupils must prove their answers with counters.



PURPOSE: Learning another way to write subtraction.

name _____

Subtract 3 from each.

9	6	8	5	7
− 3	− 3	− 3	− 3	− 3
6	3	5	2	4

Subtract 5 from each.

6	8	7	9	5
− 5	− 5	− 5	− 5	− 5
1	3	2	4	0

Subtract 0 from each.

2	5	1	4	3
− 0	− 0	− 0	− 0	− 0
2	5	1	4	3

Subtract 4 from each.

9	6	8	7	5
− 4	− 4	− 4	− 4	− 4
5	2	4	3	1

© 1974, SRA PURPOSE: Subtraction practice.

lesson Page 179

goal Practice in subtracting from numbers less than 10

things counters, if necessary

page 179 STRANGE DIRECTIONS

Somebody got lazy. The problems need another number. What does the first line say? Will this help get the problems finished? Can you subtract now? You may want to have all the missing numbers written before they start to find the answers. That's up to you.

Does everyone understand? Then you're on your own.

Counters are still O.K., if needed. Check answers together. Disagree more than once so that a child will have to show **how** he got his answer.

lesson Pages 180, 181

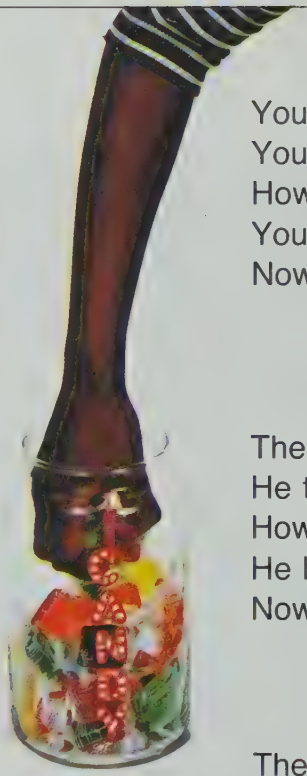
goal Relating subtraction to addition

warm-up It's been a long time since the children have done any addition. Expect some awkward moments. You may want to take time out for a short review.

page 180 Help with the reading. Act out some of the problems so that the children can see the flow of action involved. When the page is completed, ask if anyone noticed a pattern. If they don't see the pattern, it's O.K. They will soon.

180

You had 6
You ate 4.
How many remain? 2
You buy 4.
Now how many? 6



You had 3
You lost 1.
How many remain? 2
You found 1.
Now how many? 3

She had 3
She gave 1 away.
How many remain? 2
I gave her 1.
Now how many? 3

There were 8
He took 5.
How many remain? 3
He brought back 5.
Now how many? 8

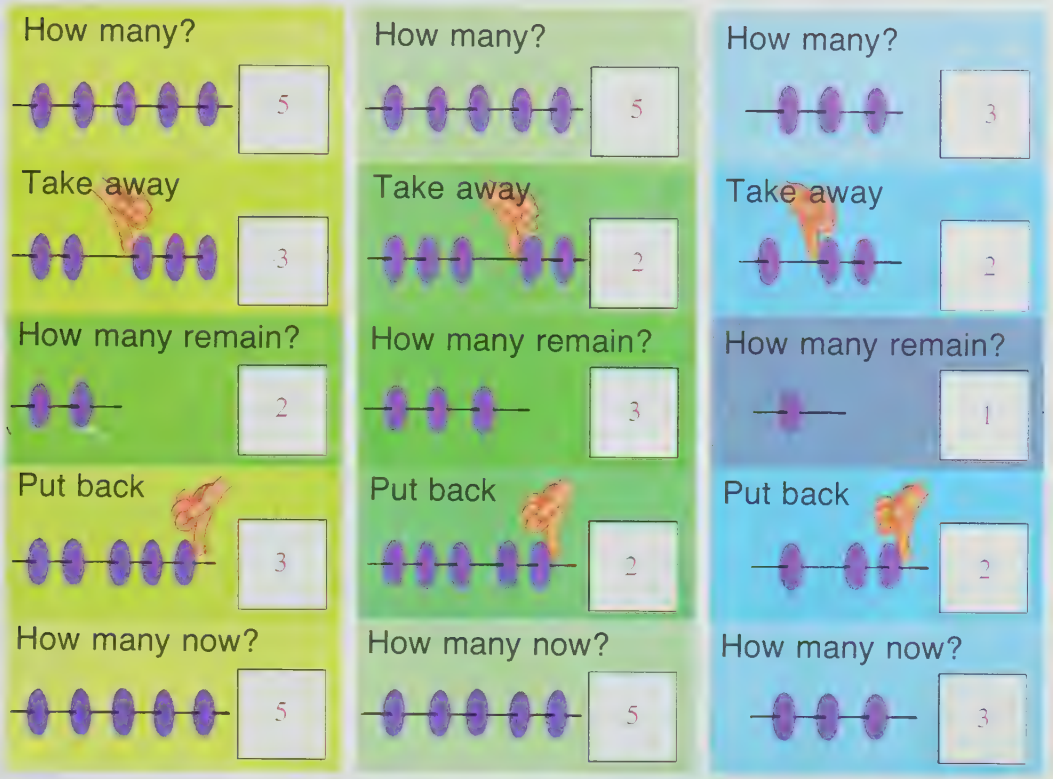
He got 7
2 were taken.
How many remain? 5
2 were given back.
Now how many? 7

There were 6
They sold 3.
How many remain? 3
They made 3 more.
Now how many? 6

PURPOSE: Relating subtraction to addition.

name _____

Fill in the boxes.



© 1974, SRA PURPOSE: Relating subtraction to addition.

things for each pupil: 1 wire of beads (activity, page 84)

Push the beads to the right to subtract, then to the left to add. Try all the possibilities for 10.

goal Relating subtraction to addition

things colored wood beads
heavy string
clothespin

warm-up String some wood beads. Leave extra string so that the beads can move. Suspend the string of beads. Have a child use a clothespin to separate 7 of the beads from the others.

We have a set of seven. (Name), come and take away 3 beads. How many remain?

Use other examples. Include addition, but don't relate addition to subtraction.

page 181 Another do-together page. And look out! These problems are in columns, not rows.

What's the first question at the top of the page? How many did you count? Where will you write the answer? Do it. What's the hand doing? How many did it take away? Write the answer. What's the next question? Write the answer.

Now what's the hand doing? Putting them back! How many are being put back? Write the answer. After they're back, how many are there? Write the answer. What do you see happening here?

Take plenty of time for this discussion. Then do the rest of the page. Finally, ask them what happened every time—in all three parts of this page. Repeat each question and use the real beads on a string, if necessary.

lesson Pages 182, 183

goal Relating subtraction to addition

things flannel board or overhead projector

warm-up Show 6 objects on the left side. Ask how many. Slowly move 2 objects to the right side.

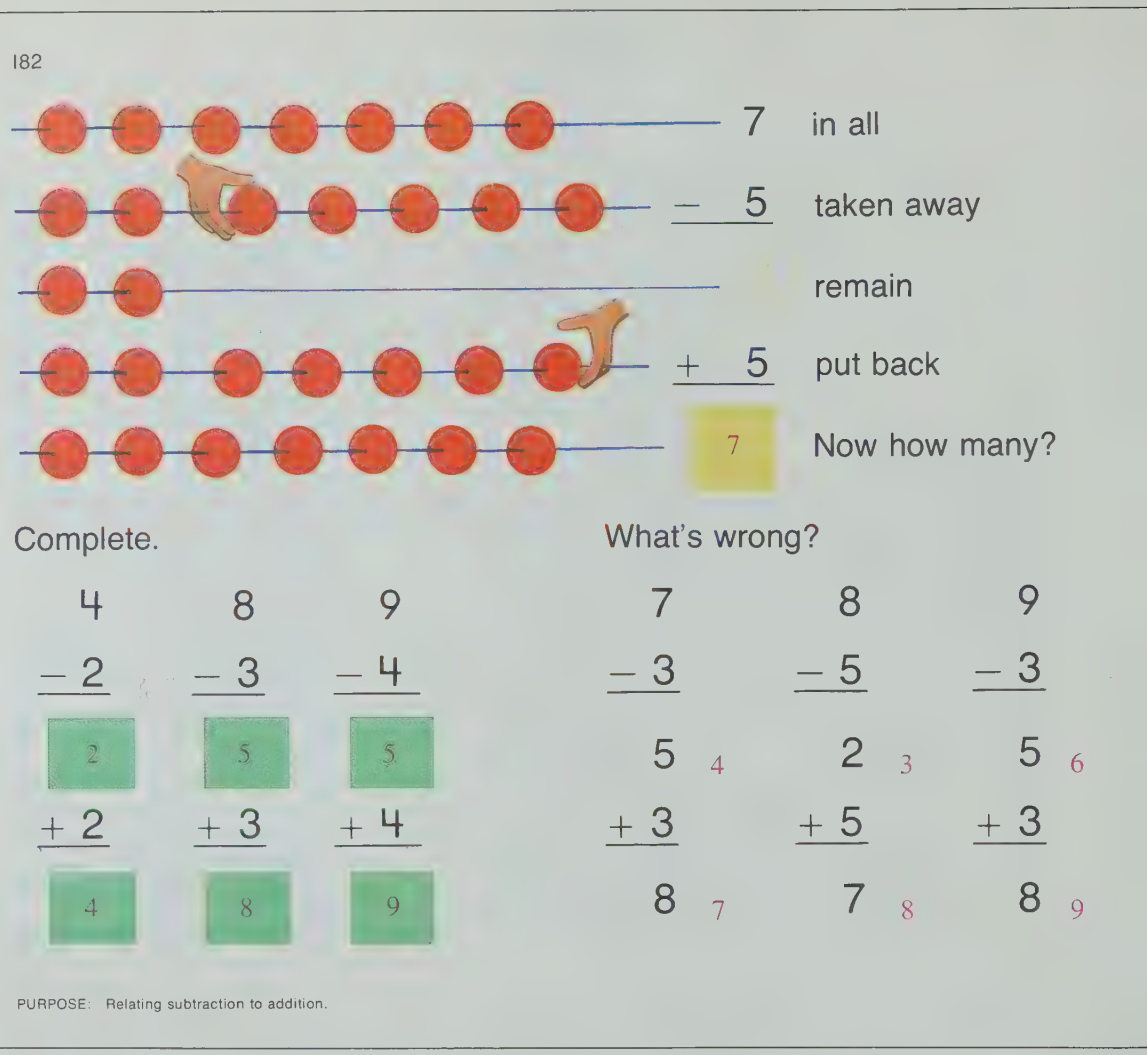
Can you think of a way to write what just happened? Use the chalkboard or have pupils write on paper. Have the problem read. *Where did the 6 come from? the 2? the 4? What signs did you use? Get ready for some more action.*

Slowly put back the 2 objects. Have the children record the action. Have it read. Discuss where each number came from and the signs used.

page 182 Discuss the bead example.

How many were taken away? How many were put back? My goodness—that's the same number! Let's see if the same thing happens again. I wonder why.

Some pupils may still need counters and the action of subtracting and adding before they can complete this page.



STOP

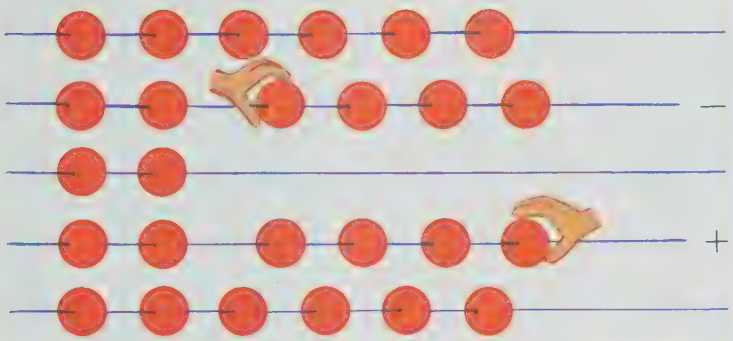
things for each pupil: paper cup, counters, +, −, =, and numeral cards

Put 7 counters in your cup. Take out 3 counters. How many remain? How do we write that? (7 − 3 = 4)

How many counters are in the cup? Put back the 3 you took out. Now how many? Try to write that. (4 + 3 = 7)

Use unshelled peanuts instead of counters. Correct? Keep a peanut.

name _____



6		in all?
4	−	take away
2		remain
4	+	put back
6		Now how many?

NOW IT IS YOUR TURN

9	6	3
− 6	− 2	− 0
3	4	3
+ 6	+ 2	+ 0
9	6	3

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PURPOSE: Relating subtraction to addition.

STOP

Make a ladder on the board. Use a marker and start counting only when you move the marker. Start at step 4. Climb up 3. You are at ____. Climb down 3. You are at ____. Start at 7. Go up 3. 7 + 3 = ____. Go down 3. 10 − 3 = ____.

10
9
8
7
6
5
4
3
2
1

goal Relating subtraction to addition

page 183 *What's going on?*

Let the children discuss what they see—pushing one way to take away, then pushing back to add. Probe with questions to see if the children can discover how to find the missing numbers. More important, can they discover the relationship between subtraction and addition? Try not to give any hints. Your final question should be: *What does this mean?*

The conclusion is that we can write an addition problem for any subtraction problem. Try one. 3 − 1 = 2 What has been taken away? How many will have to be put back? Praise them for their good thinking. This should be an exciting session. Have fun.

Watch out for the pupil who writes a problem like

3	or	3
−6		−6
3		3
+6		+6
9		3

He must prove his work with counters. Don't give up on this. You have the chance to prevent faulty thinking that accidentally happens when subtraction is developed.

lesson Page 184

goal Finding other names for a number

warm-up This is the time for a comprehensive review of addition. Write the following sentences on the board:

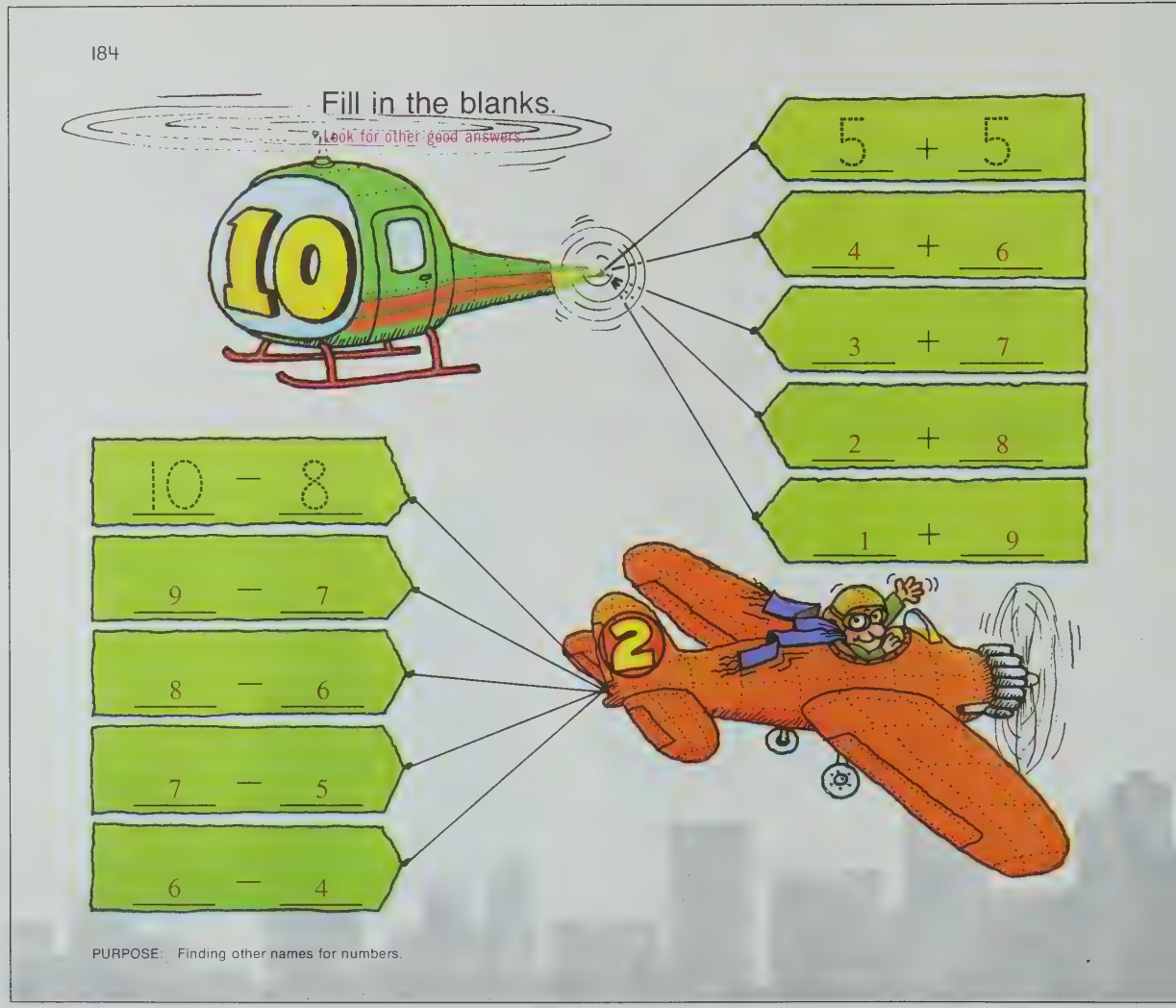
$7 + 4 =$	$10 + 1 =$	$8 + 4 =$
$3 + 0 =$	$6 + 3 =$	$9 + 2 =$

If the responses are not quick and sure, back to counters and ten-trays for a day or two. Be sure to record the action. Do not continue in the book until the pupils are at ease again with addition.

Now review the name game (page 171). Write 9 on the board. Have the children list all the **addition names** they can think of ($9 + 0$, $8 + 1$, and so on). New round: Write 3 on the board. This time they are to use **subtraction names** only ($6 - 3$, $5 - 2$).

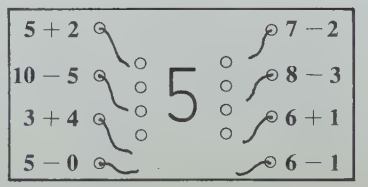
page 184 Can anyone figure out what to do on this page? When directions are clear, this is independent work. Check by reading the sentences together.

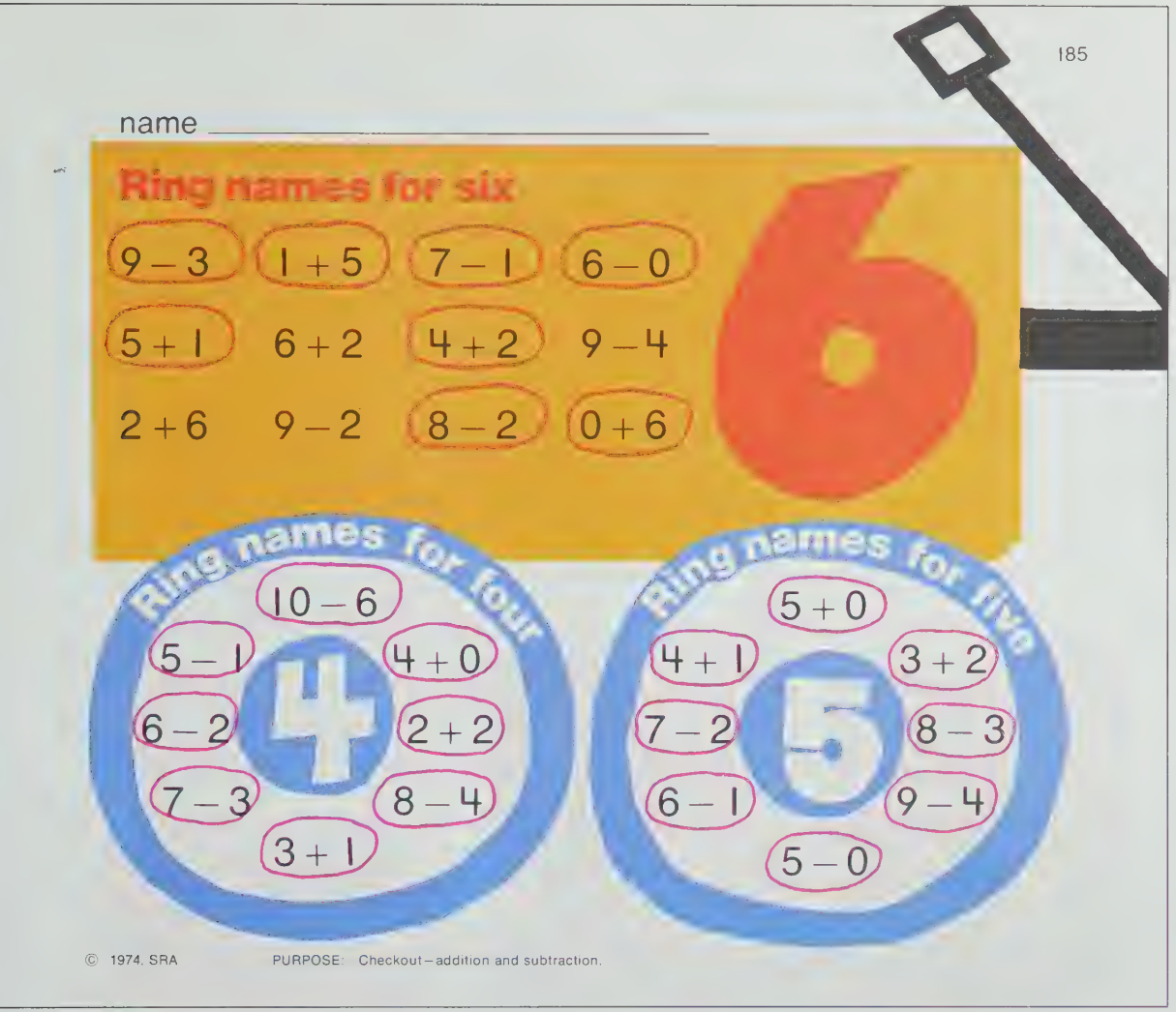
Who found a different name? Keep lists on the board. Total the number of names found for 10 and for 2. Which list had the most?



things poster board, shoelaces

Adapt the shoelace idea to renaming numbers. Include facts that do not name the number.





lesson Pages 185, 186

goal **Checkout** – addition and subtraction facts

things overhead projector
counters

page 185 Read together the possible names for 6 shown on the wagon. Act surprised that you heard both plus and minus. You will have to decide whether your pupils can handle directions for the entire page at this time. You may want to take just part of it at a time. Have them mark their answers independently. Note those children who still need counters. Give them your special attention whenever you can spare a few minutes. Remember – it's better to allow the use of counters than to have children feel that they are failures.

For a change of pace when the checkout is completed, use the overhead projector with a small group. It has great gimmick value when the kids are in control. Use a large sheet of paper on the wall if you don't have clean wall space. Get them started. One child arranges counters on the viewing stage while the others cover their eyes. *Look at the screen. How many? Cover your eyes.* The child removes some counters. *How many remain? How many were taken away?* The youngster at the projector confirms the answer. The counters are there to settle any disputes.

things index cards

Have each pupil make flash cards for the facts he missed. Then pair him with a capable youngster for more practice.

goal Relating subtraction to addition

memo This page is a real challenge! You may not want to use it with less-able pupils, choosing, rather, to give them individual attention.

things for each pupil:
+, −, =, and numeral cards

warm-up *Take out only your cards for 3, 6, and 9 and your plus, minus, and equals signs. Jumble them all up. Can you take these cards and make an addition sentence? Try it! Who has one? What did you write? Now try to make a subtraction sentence. Do you have one? What did you write?*

Repeat for 4, 5, and 9. The children's work will tell you if they need more practice.

page 186 These are some very grownup directions. Can anyone read them? Who knows what to do?

A challenge but fun!

186

Take the things out of the bag.
Put them together. Tell a math story.

Accept any one of these:

8 − 5 = 3

8 − 3 = 5

3 + 5 = 8

5 + 3 = 8

Accept any one of these:

6 + 0 = 6

6 − 6 = 0

6 − 0 = 6

0 + 6 = 6

3 + 3 = 6

6 + 3 = 9

3 + 0 = 3

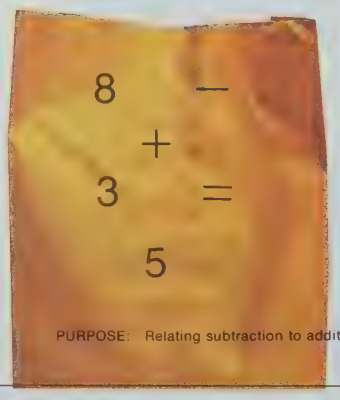
9 − 3 = 6

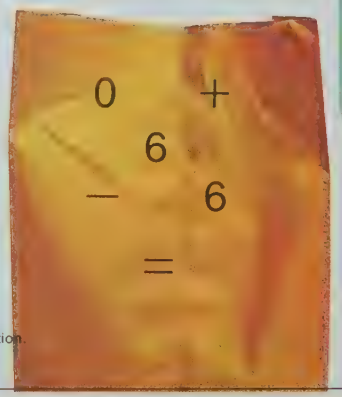
6 − 3 = 3

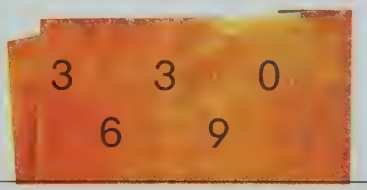
3 − 0 = 3

Also accept: 3 + 6 = 9
0 + 3 = 3

Also accept: 3 − 3 = 0







PURPOSE: Relating subtraction to addition.

things small bags, (cardboard disks)
Take your cue from the page. Numerals and signs are written on the chips with felt pen.
Some possible combinations:
0, 4, 4, 8, 12, +, −, =
0, 9, 9, +, −, =
5, 7, 12, +, −, =
3, 8, 11, +, −, =

A different combination goes in each bag.
Have pupils record each sentence and try to find still others.

RESOURCES

another form of evaluation

for progress check—page 175

You will need 25 counters.

Do the finger-play activity again for subtraction. The rules have to be changed a bit so that you can use both hands to show a number. The pupil tells you the number of fingers he wants you to take away. You promise you will take them away if he will tell you how many fingers will remain when you take away the number of fingers he said. He will know quickly whether his answer was correct. If it was, he gets a counter. If he gets all the counters, he deserves a prize. Maybe it could be a note home telling his parents what a good job he did. (You might also mention in your note that extra practice at home at this point would be appreciated.)

for progress check—page 177

The pupil will need his numeral cards. You will need two more sets of numeral cards along with a big minus symbol.

This evaluation activity was also suggested for addition. Put the minus symbol on the table. The pupil puts down a numeral card on one side of the minus symbol. You put one down on the other side. He tells the answer. If his answer is right, he gets to keep your card. If he is wrong, you get to take it back so that you can play it again. The goal is for him to win all your cards. He can replay any card he has. Watch out, because the numbers are still limited to 9, and you can't get caught with the 7, 8, and 9 cards left in your hand.

Jot down the combinations the pupil misses so that he can have his own personal study sheet when you finish.

for checkout—page 185

Use still one more addition evaluation idea for subtraction. You will need 2 one-inch-wide strips of heavy paper at least 11 inches long. Put these ten numerals equally spaced on one strip:

9 8 5 6 7 9 6 8 7 9

Put these numerals on the second strip:

4 2 3 0 5 1 4 3 6 7

(Notice the only troublesome numbers are the last two on the bottom strip. You won't be able to subtract those from just any number on the top strip.) Put one strip above the other. Have the pupil cup his hands so that he can see only one numeral on each strip. This will be the subtraction combination he is to complete. Remember—the pupil keeps his hands in one place. You move the strips so that new combinations show.

activities

things for each pupil: piece of paper

In the center of your paper write a large 4. Make some arrows going from this 4. At the end of each arrow, write a name for 4.

Challenge the most capable children to write still another name for one of the numbers.

additional learning aids

concept—chapter objectives 1, 6, and 7

SRA products

Inquisitive Games: Exploring Number and Space, SRA (1967)
- Animal Toss
- Buy and Sell Games I, II
- Plus and Minus Signs
- Theater Tickets Games I, II

Mathematics Involvement Program, SRA (1971)
- Cards: 251, 252, 332

Visual Approach to Mathematics, level 1, SRA (1967)
- Visuals: 2, 3, 4, 5, 6, 7, 8, 9, 10, sixth and seventh suggested activities

other learning aids (described on page 256g)—Abacus Board, Balance scale, Cuisenaire Rods, Keyboard Counter

notation—chapter objectives 2 and 5

other learning aids—Magic slates

operation—chapter objectives 3 and 4

SRA products

Computapes, SRA (1972)
- Module 1, Lessons: AS 5, 11, 12, 13, 14, 15

Skill through Patterns, level 1, SRA (1974)
- Spirit masters: 29, 30, 31, 32, 45, 46, 47

other learning aids—I Win (set 1), Make and Take Game, Mathfacts Games (addition, subtraction—levels 1, 2, and 3), Mini Veri-Tech, Quizmo* (add-subtract)

*Registered trademark of Milton Bradley Co.

9 LOOKING AT SHAPES

before this chapter the pupil has—

1. Sorted objects into sets that are alike
2. Told how objects are alike and how they are different

in chapter 9 the pupil is—

1. Finding straight and curved surfaces and sides
2. Finding edges and corners
3. Finding differences between a circle and a rectangle
4. Recognizing squares and triangles

in later chapters the pupil will—

1. Sort a set of objects such as boxes, cans, and balls according to their likenesses and their differences
2. Find the flat surfaces and curved surfaces on such objects as boxes and cans

Notes & Things

The study of geometry will continue to be informal. The exploration of size and shape begun in chapter 2 will continue and blend with the past activities with measurement. The pages in the pupil book will emphasize the flat surfaces and the sides of boxes and cans. This will allow the examination of rectangles, squares, and circles. The triangle will come from folding a square piece of paper on the diagonal. The contrast between the numbers of straight sides will be studied.

Take all the time necessary to do the following activities before any work with the pupil pages. Lots of hands-on activities with objects in the junk boxes are an important chapter warm-up. There are four types of activities that every child should have:

- sorting according to shape
- sorting according to size
- investigating length
- investigating capacity

You will be expecting them to work together in the small groups. This may be a new experience. The first day they should explore and discover that they are not working independently, but rather in a group and are therefore responsible for sharing ideas. Getting them to act as a group to solve problems, make decisions, and finally report the action of the group will not be easy. Have patience.

On that first day empty the junk boxes in the middle of the groups. Their job is to help you sort out the things. Then give an empty box to each of the four groups.

Group 1 should put into their box all things that can hold something like popcorn or ice cream or precious stones from the moon. (They will be taking the boxes, cans, cartons, bottles, paper or plastic drinking cups, cardboard tubes from paper products, oleo tubs, plastic bowls, etc.) The box should be labeled with a big numeral 1.

Group 2 should put into their box all the things that they could use as counters. (They will be sorting out like objects and putting them into plastic bags before they go into this box—if they aren't already in bags. They will find the cubes, beads, paper clips, nuts, buttons, spools, dried beans, seashells, old crayons, tongue depressors, plastic drinking straws, etc.) The box should be labeled with a 2.

Group 3 should find all the things they could use to measure length. (They will be finding the pieces of yarn, ribbon, rope, string, cardboard or wood strips, wire, old dress belts, etc.) The box should be labeled with a 3.

Group 4 should find all those things that are flat and have straight or curved sides. Try to have at least three colors and at least three sizes of circular regions. Floor tile, ceramic bathroom tile, rubber sink-drain covers, plastic covers from coffee or pet-food cans, step treads, carpet squares, and paper plates are just a few of the things that may end up in this box. It should be labeled with a 4.

And now go headfirst into the most difficult task. Each group should decide how the objects in their boxes are alike and how they are different. They should talk together and then decide on one person in the group who will tell everyone in the class how the objects in his group's box are alike. They should decide on another person to tell everyone how the things are different. They will probably need a great deal of guidance this first day. Good luck!

The following four activities are each related to a specific box.

Activity 1 with box 1: Supply three large sheets of construction paper. The goal is to build a different set on each sheet of paper. The first set of objects should be alike in some way. (The way they are classified as being alike is up to the children.) Another set of objects should be built on the second sheet. This set should also be alike in some way. The third sheet will have all the objects that are different from the other two sets.

Don't forget that the pupils may classify according to color or split things made of plastic from those made of paper. Each of these is a perfectly good basis for sorting. But if this happens, try to get them to sort again—this time according to size or shape.

Get the pupils to select one person to tell you why the things in each set are alike.

Activity 2 with box 2: Supply three large sheets of construction paper. The goal is once again to build a different set on each sheet. One set of objects should be alike in some way. Let the pupils decide in what way they are alike. The second set should also be alike in some way but different from the first set. Can a third set of objects be built that are alike in some way? Try it. All the stuff that doesn't match one of the three sets can stay in the box.

Get the pupils to select one person to tell you why the things in each set are alike.

Activity 3 with box 3: The goal of this activity is to find out which object is the longest and which is the shortest. Are there any the same length? Now put them all in order from shortest to longest.

There is a second goal. Is one object wider than another? Are there any the same width? Which is the widest? Now put them all in order from the widest to the narrowest. This group will also need one person to report the group's findings.

Activity 4 with box 4: Again use three large sheets of construction paper. Sort those things with curved sides on one sheet, all those with straight sides on the second sheet, and those that have both curved and straight sides on the third.

Get this group to select one person to tell about this work too.

Each group should do each of these activities. Perhaps you will think of still more good things to do in the sorting category. Individual children may want to continue playing with the objects.

Good! But with these four activities, you can be sure that all prior learning has been reviewed. The groups should be able to move confidently to the pupil pages.

Your key questions for this chapter are "How are these alike?" and "How are they different?"

words

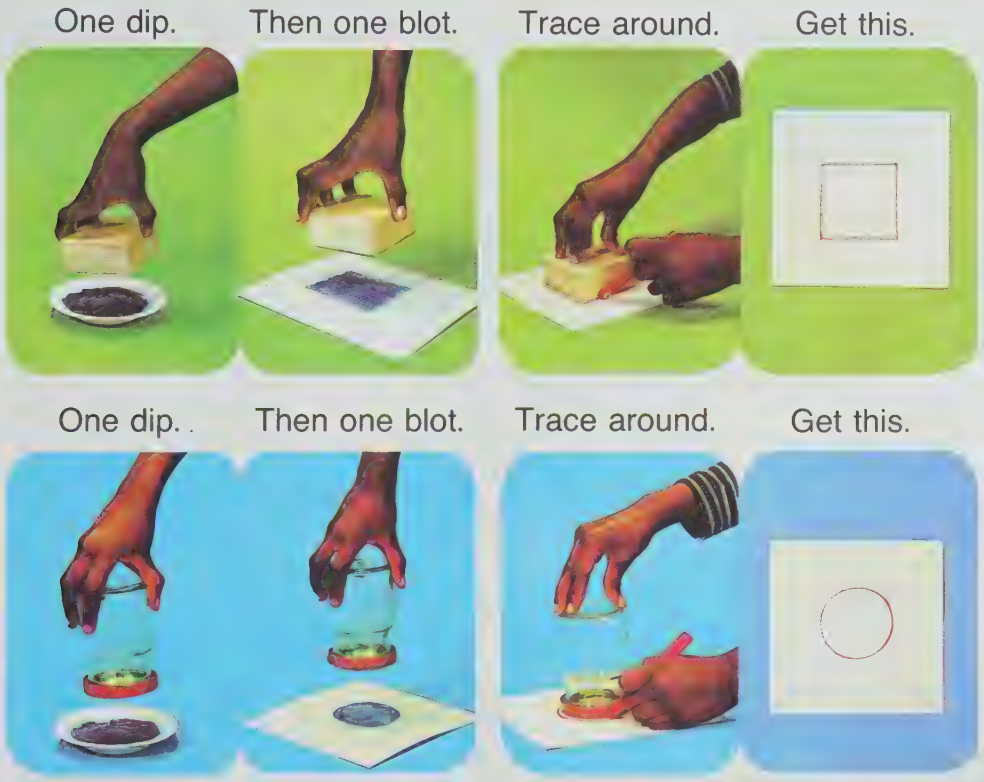
New concept-development words are listed in the order in which they are orally introduced. Words also on the pupil page are marked with *.

edge*	geoboard
corner	square*
rectangle*	triangle*

things

the contents from the junk boxes (Different sizes of cans and boxes are a must.)
4 boxes, one for each group
large sheets of construction paper
shallow dish
liquid soap or water-base paint
string
geoboard or pegboard with pegs and rubber bands
scissors

name _____



© 1974, SRA PURPOSE: Finding rectangular and circular regions, straight and curved edges.

lesson Pages 187, 188

goal Finding differences between straight and curved

memo Before beginning this page, be sure to read Notes and Things, page 186c.

things shallow dish, cube, boxes, cans
liquid soap or water-base paint
construction paper

page 187 Use the page to discuss how to make blots. As the children work, circulate, question. And please

have patience!

What happened? What is that shape? How are the 2 blots different? Listen to their words but help them if they get stuck. When they're ready to go on, discuss how to make tracings.

How are these tracings different from the blots? How did your pencil go as you traced around the box? (Accept or introduce **straight**.) *Why did the pencil go straight? How did your pencil go when you traced the can?* (Accept or introduce **curved.**) *Why did the pencil go in a curve?*

Can a box roll? What about a can? Test each. *What does a box have that keeps it from rolling?* (Accept or introduce **flat surfaces.**) *When will a can roll?* Place the can on its flat surface, then on its curved surface. (Accept or introduce **curved surface.**)

goal Finding differences between a circle and a rectangle

things string
for each pair of pupils: can, box

warm-up Hold the ends of a piece of string and pull until taut.

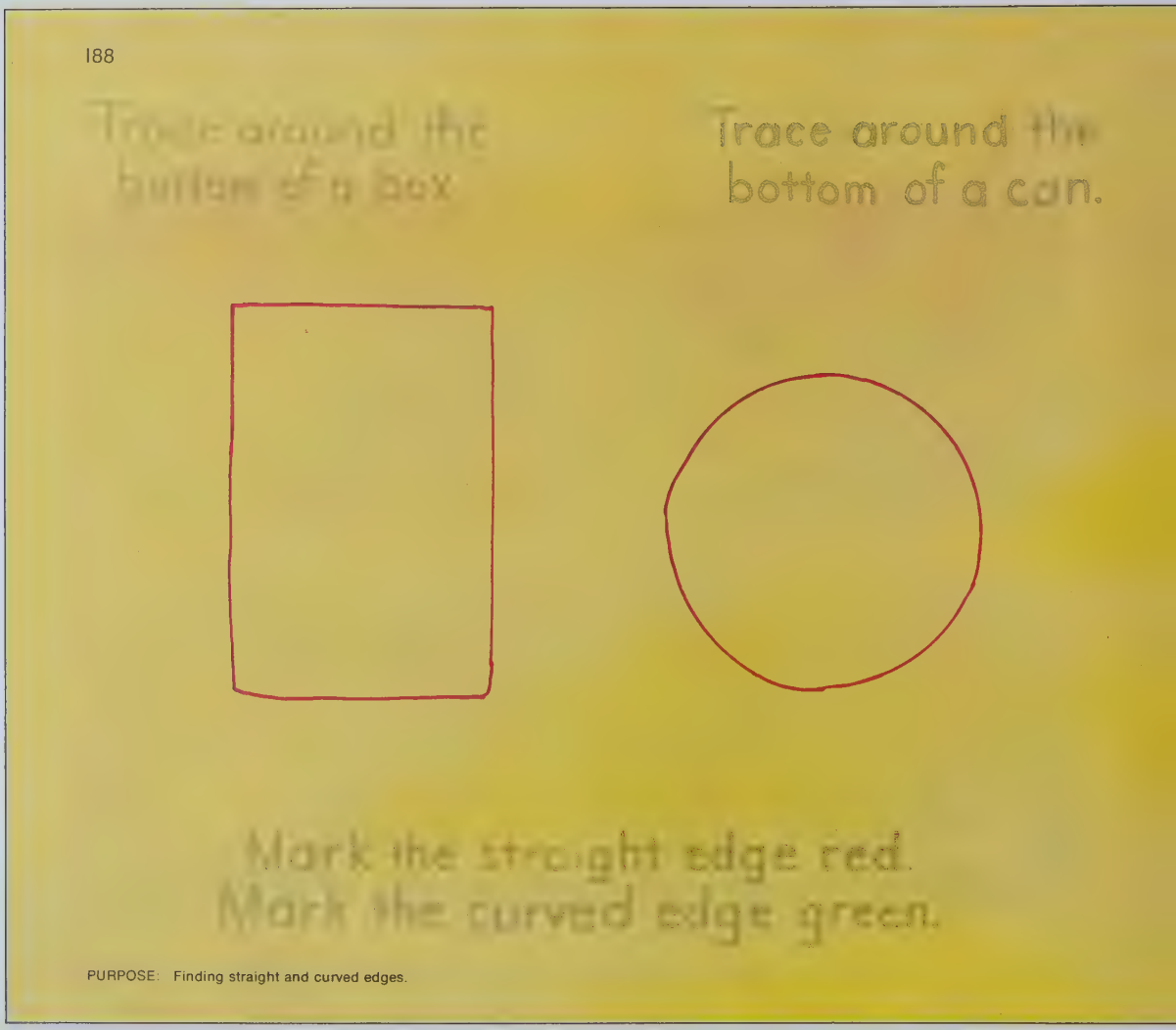
I'm holding this string so that it is . . . Get them to say **straight.** Relax the string. *Now the string is . . .* (Curved)

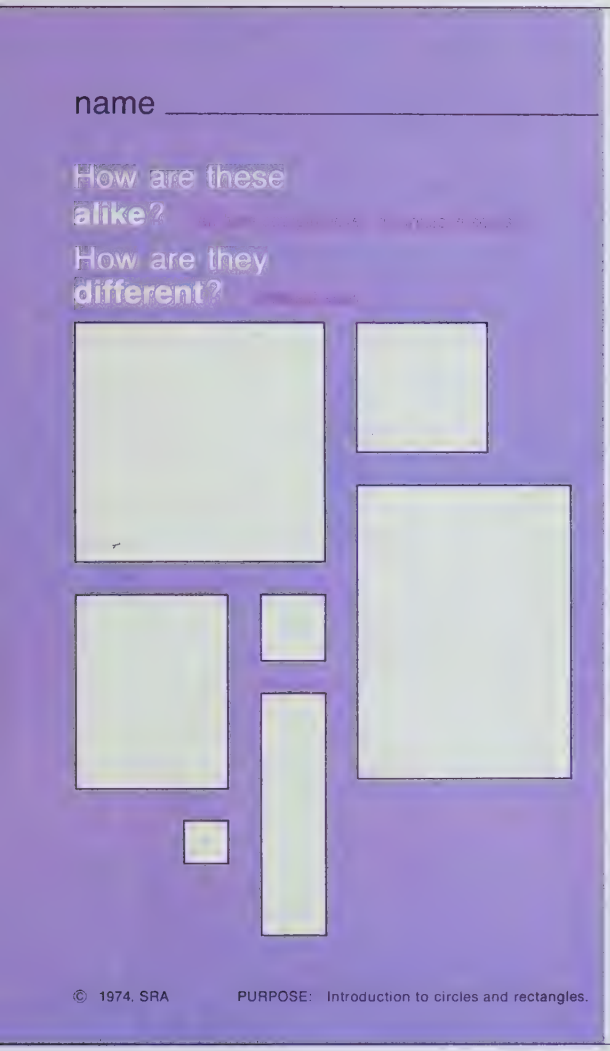
Have each child show the EDGE of his desk, book, paper. Do they all understand the word? Have each hold up his box and run his fingers along an edge.

How does the edge feel? (Straight) *Does it have any* CORNERS? *How many?* Repeat the same questions with a can. *Does the edge of a box feel different from the edge of a can? Which shape has corners?*

page 188 Discuss directions. Then children work independently. Discuss the results.

What shape does the tracing of a box make? (Introduce RECTANGLE.) *What shape does the tracing of the flat surface of a can make?* (Accept or introduce **circle**.) *How are a circle and a rectangle different? How many straight edges did you need to make a rectangle? How many corners? How many curves to make a circle?*


188
Trace around the bottom of a box.
Trace around the bottom of a can.
Mark the straight edge red.
Mark the curved edge green.
PURPOSE: Finding straight and curved edges.



lesson Pages 189, 190

goal Finding differences between a circle and a rectangle

warm-up Trace the edge of several different sizes of cans or jars on the chalkboard. Trace some boxes too. Choose a child to mark the largest circle with an **X.** Pick another to mark the largest rectangle with a ✓. Alternate until all the shapes are marked in order of size. Discuss why a figure is a circle (curved, closed, no corners) and why a figure is a rectangle.

page 189 *What shapes do you see at the left of the page? How are they alike? How are they different?* Don't be too technical. Let them use their own words. Listen for straight edges, number of corners, size. They have no way of measuring the length of the sides, but let's get them ready for the next lesson by at least looking. Compare the circles. Does anyone say that all the circles are curved?

If you were a builder, what could you make with these shapes? Trace the largest circle and the smallest circle with red. Choose another color and trace the largest and smallest rectangles.

goal Introduction to squares

things geoboard or pegboard
rubber bands

warm-up Have someone draw a rectangle on the board. Freehand won't do—trace around a box.

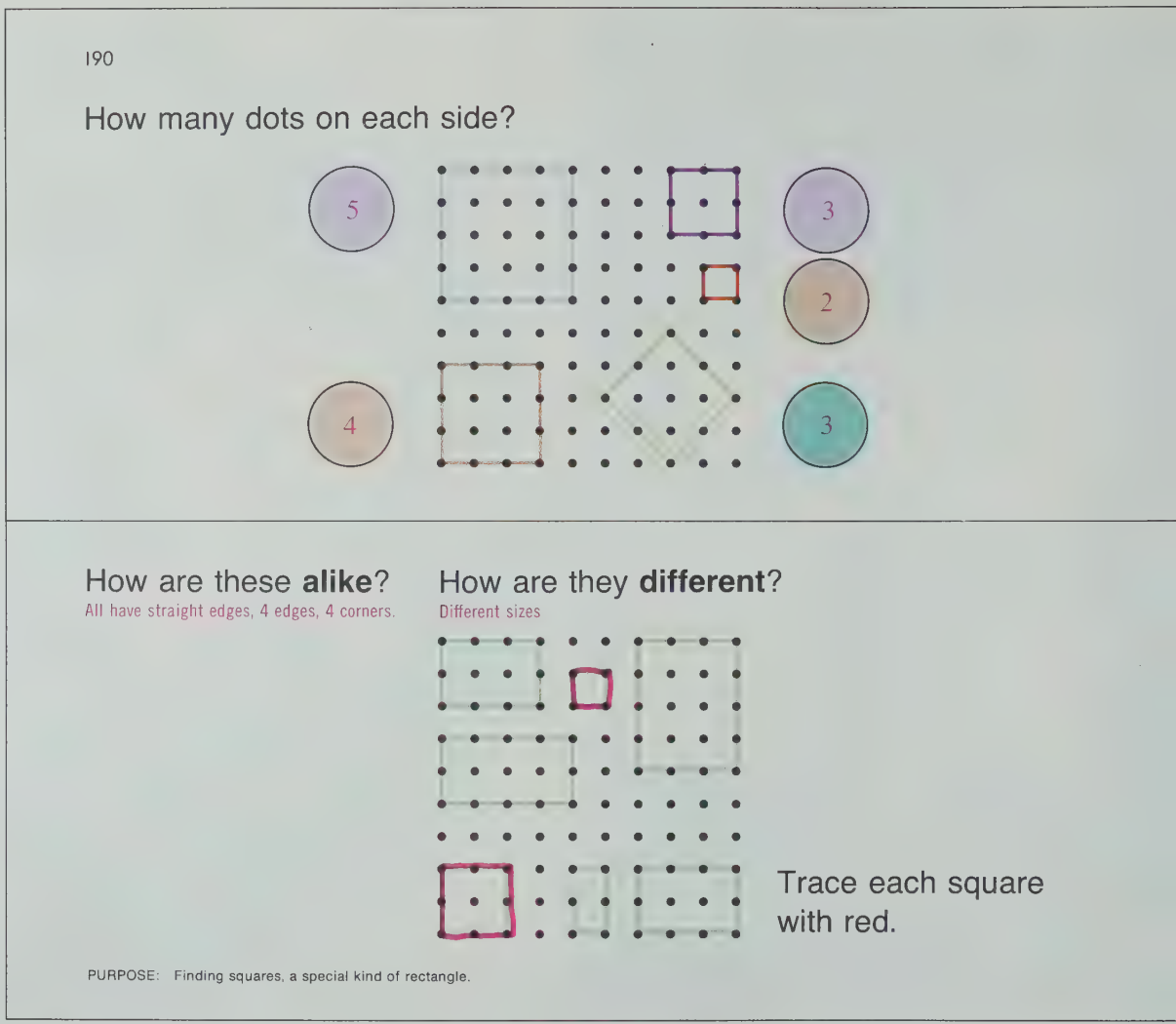
Use a GEOBOARD and rubber bands to form several rectangles. (If you can manage to borrow enough boards for everyone, by all means use them now.) Stress the concept of **straight sides.**

page 190 *Here is a picture of a geoboard.*

Read the sentence at the top. *What does that mean? On each side of what?* Discuss where to write the number.

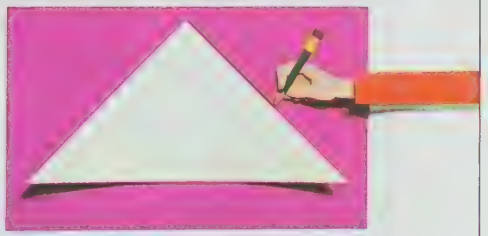
When the top of the page is completed, discuss. *What shape are these?* (If they answer rectangle, agree.) *But it's a special rectangle. What makes it special?* (All sides of each figure are the same size, or length, or have the same number of dots.) *This special rectangle is called a* SQUARE.

Discuss the rest of the page. Lead them to see how a square is different from other rectangles. Then have them trace each square in red.



name _____

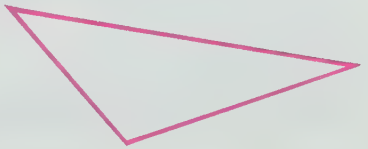
Fold a square into halves like this.



Cut it apart.

Trace each part.

How are these alike? Draw one more. 3 corners, 3 edges, 3 straight edges



© 1974, SRA PURPOSE: Finding triangles.

lesson Page 191

goal Introduction to triangles

things for each pupil:
square piece of paper
scissors

page 191 Distribute the square paper. Use the page to help you explain the directions for the activity. You may want to demonstrate before the children fold. Continue with the cutting and tracing directions. Distribute paper for tracing. When the tracing is completed, ask if anyone knows the name for this shape. Accept or introduce TRIANGLE.

What kind of sides does a triangle have? How many sides? How many corners? How is a triangle different from a circle? from a rectangle? from a square?

Discuss the remaining directions. Children should work independently. Compare results by having them match their cut triangles and decide whether the drawn triangles are similar to the ones that were cut.

lesson Page 192

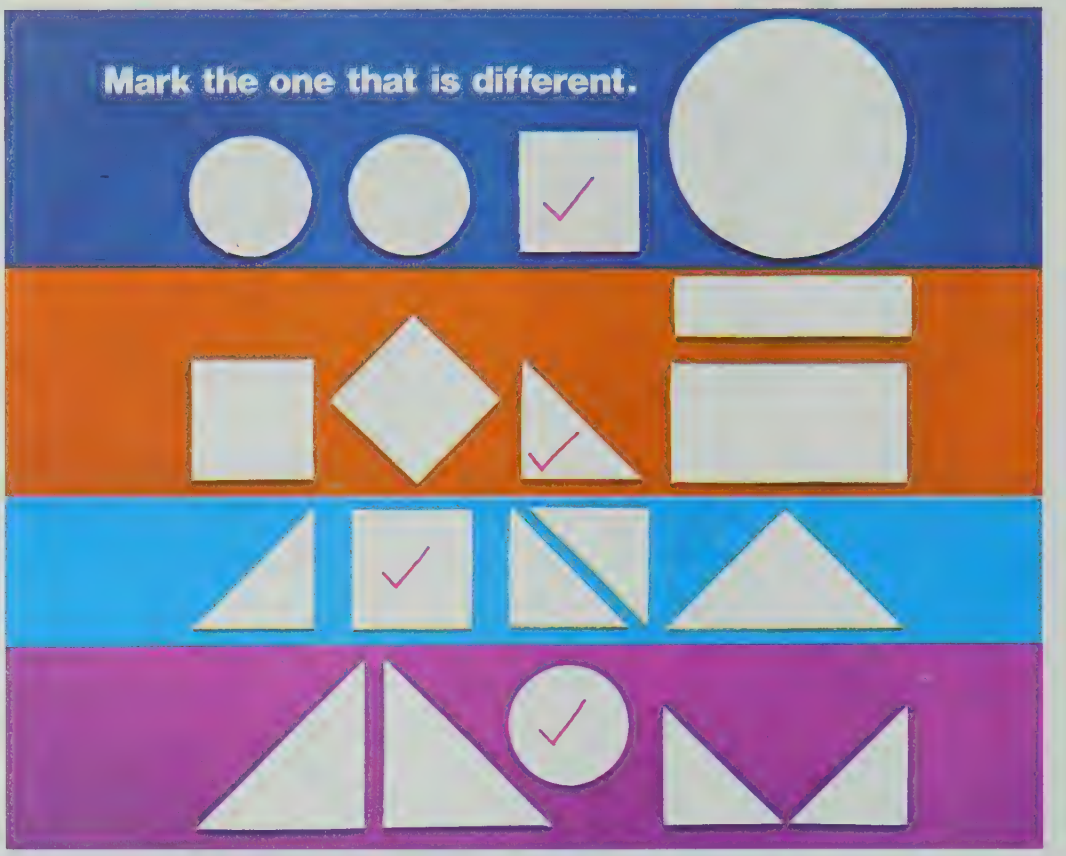
goal Recognizing likenesses and differences

page 192 Discuss directions. Children work independently. Discuss results.

Which one is different? Why? What is it called? How are the others all alike? What are they called?

Extend the page activity. *Use an* **X** *to mark each shape that makes you think of part of a can. Use a* ✓ *to mark each shape that could be one part of a box.* If you get an unpredictable answer, take time out to have the pupil tell you his reasoning.

192



PURPOSE: Classifying shapes.

things cans, boxes

Show 3 different-size cans and 1 box. Ask which one is **different.** Then show 3 different-size boxes and 1 can. Repeat the question. Does the child show that he understands the word **different**? If not, continue with a set of 3 same-size vegetable cans and 1 coffee can.

name _____

How are these alike?

Orange all have straight edges, 4 edges, 4 corners.
Purple all curved, round, circles.
Blue all have straight edges, 3 edges, 3 corners.

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PURPOSE: Classifying shapes.

lesson Page 193

goal Classifying shapes

page 193 A do-together page. Discuss how the shapes of the same color are alike. Call each shape by its name. Make a chart on the chalkboard to summarize the children's findings. Use the following guide.

	rectangle	square	circle	triangle
kind of sides				
number of sides				
number of corners				

goal **Checkout** – recognizing circles, rectangles, squares, and triangles

page 194 If the children can't read directions, make a code on the chalkboard or on a piece of paper. Draw a red square, a blue rectangle, a yellow circle, a green triangle (outlines only). Now discuss the directions. Let them work independently.

After you have checked their work, discuss the results. *Which things are shaped like a circle? How many in all?* Continue for the other shapes.

When you are finished go back. Have the children cut out the shapes on page 193. These can now be used to create something – a snowman, a clown, or a tree. Once laid out on paper, the shapes can be pasted.

Or let the children cut out the things on page 194 and then sort them however they want. There is no one answer. Discuss the results. They may have sorted by shape; by type of food; by foods that go together; by "what I like" and "what I don't like"; whatever.

Go on a triangle, rectangle, circle hunt. How many things can you find that have edges that make a triangle? a rectangle? a circle? Trace each to prove it.

things for each group: 2 sheets of paper, cans and boxes of several sizes

Trace the edges of the cans on one sheet of paper, the boxes on the other. Does the size of the can change the shape it makes? What does it change? (Size of circle) Repeat the questions for the boxes.

RESOURCES

another form of evaluation

for checkout—page 194

The pupil will need scissors, paste, 4 sheets of paper, and several old magazines. (The women's magazines that are sold in grocery stores have a lot of pictures in them.) You will need to label each of the 4 sheets. Mark one to show a square, another to show a rectangle, the third to show a circle, and the fourth to show a triangle.

The job is a simple one. Go through the magazines and find at least one picture that shows a shape like the one at the top of each paper. Cut it out and paste it on the paper. (Watch out for frustrations in finding a triangle. That shape doesn't show up very often in magazine pictures.)

ART PROJECT: Make a bulletin-board scene from all geometric shapes. For example: houses and stores made from squares, rectangles, and triangles. The children can cut and paste or use paint and crayons. Add trees, plants, strange animals, and birds—all made from geometric shapes.

Have those who are having trouble help cut the shapes, sort them, and then identify them when the scene is finished.

additional learning aids

concept—chapter objectives 1, 2, 3, and 4

SRA products

Mathematics Involvement Program, SRA (1971)
Cards: 71, 81, 111, 311, 122, 242, 302, 342
Skill through Patterns, level 1, SRA (1974)
Spirit master: 33

other learning aids (described on page 256g)—Cuisenaire Geoboard Classroom Kit, Geoboard Activity Cards (primary set), Color & Shape Bingo, Math Bingo, Attribute blocks, Soap-film Shapes

letter to parents

Dear Parents,

If your child has come home and told you that he had lots of fun playing with a bunch of junk, that will be a true statement. We have been studying geometry again. Tin cans, boxes, and balls helped build the idea of curved and flat surfaces. Circles and rectangles came from tracing the bottom of a can or a box.

The next time you go for a walk or travel with your child, it would be fun and helpful to play an "I Spy" game of finding shapes. Balloons, a dip of ice cream, a person's head, and a grapefruit are all shaped like a ball. You will find circular shapes painted on outdoor billboards and on labels. A plate or a wheel is shaped like a circle too. Use the same kind of looking to find things shaped like a box or a rectangle, things shaped like squares, and things shaped like triangles. This activity can be fun for the whole family.

We will continue to deal with the real world as the next chapter on money is presented. It is important that your child be able to recognize a penny, a nickel, a dime, and a quarter—and know their value as well. Practice in finding the amount of money a set of coins is worth provides a perfect lead-in to extend the addition skills. We will be quite careful to present only the addition problems that do not need renaming. (When we were in school, renaming was called carrying.) Renaming will be saved for study at the next level. Look at the work pages your child brings home, and you will get a good idea of the kinds of problems your child is expected to do. No extra addition practice will be needed at home if he knows the addition combinations.

We will keep you informed of progress.

10 ADDITION OF 2-DIGIT NUMBERS

before this chapter the pupil has—

1. Practiced addition facts with sums through 18
2. Used the horizontal and vertical forms for addition
3. Counted by tens from 10 to 100
4. Written the numerals 0 to 100
5. Worked with place value in 2-digit numbers

in chapter 10 the pupil is—

1. Counting by twos, fives, and tens to 100
2. Recognizing coins and counting their value
3. Matching sets of coins that have the same value
4. Solving word problems involving money
5. Adding two 2-digit numbers, with no renaming
6. Solving word problems involving addition

in later chapters the pupil will—

1. Count, say, and write the numbers of members in a set of zero through one hundred
2. Compare two numbers from 0 to 100 by saying "more than," "less than," or "equal to"
3. Write the numeral for a given number of tens and a given number of ones
4. Add any two numbers with a sum less than 100 and requiring no renaming

Notes & Things

It looks as though we are still a couple of years away from the cashless society, so this chapter is devoted to the recognition of coins and to counting their value. Some practice in adding amounts of money is provided as an application of addition.

Counting nickels is an excellent way to count by fives, just as counting dimes provides a meaningful way to count by tens. The computation dealing with money will provide the finest readiness for addition of two 2-digit numbers.

Most children can find the sum of any two whole numbers by using sets and counting how many in all. The process might have been all right when we were working with relatively small numbers, but it becomes time-consuming and cumbersome when working with sums greater than 18. This chapter introduces a method for the addition of a multiple of ten and a 1-digit number; the addition of two 2-digit multiples of ten, as well as the addition of two 2-digit numbers with no renaming.

Let's look at examples showing the method.

To add 30 and 7, follow these steps:

1. Add 0 ones and 7 ones.
   The sum is 7 ones.
2. Write 7 in the ones column.
3. Add 3 tens and 0 tens.
   The sum is 3 tens.
4. Write 3 in the tens column.

tens	ones
3	0
+	7
3	7

Follow the same method to add 40 and 30:

1. Add 0 ones and 0 ones.
   The sum is 0 ones.
2. Write 0 in the ones column.
3. Add 4 tens and 3 tens
   The sum is 7 tens.
4. Write 7 in the tens column.

tens	ones
4	0
+3	0
7	0

The same method is used for any two 2-digit numbers.

words

New concept-development words are listed in columns in the order in which they are used orally. Those words that also appear on the pupil pages are marked with *

can*	penny
cents*	value*
dime	quarter
nickel	

things

enough sets of 10 pennies, 10 nickels, 10 dimes, and 1 quarter so children can have hands-on experience with these real coins
flannel board, numerals, ¢ symbol, play money with felt backing
ten-trays and counters
show-me charts and numeral cards for each pupil

name _____

2	4	6	8	10
12	14	16	18	20
22	24	26	28	30
32	34	36	38	40
42	44	46	48	50
52	54	56	58	60
62	64	66	68	70
72	74	76	78	80
82	84	86	88	90
92	94	96	98	100

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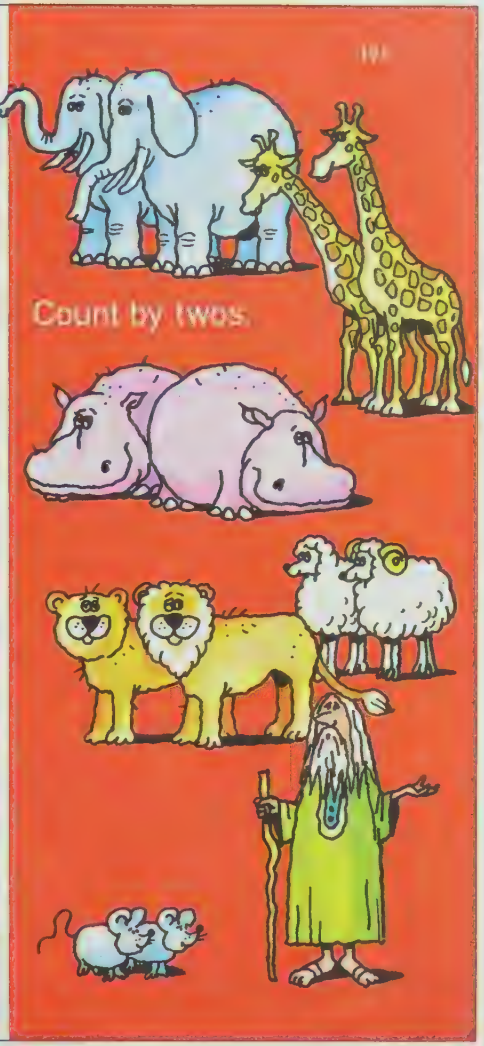
PURPOSE: Counting by twos.



lesson Pages 195, 196

goal Counting by twos to 100

warm-up How far can the children orally count by twos? If they don't understand, get them started.

Teacher (softly): One.
Children (big voices): Two.
Teacher (softly): Three.
Children (big voices): Four.

Continue until you feel you can drop out and they can carry on with their special numbers. If at first they don't succeed, try again.

page 195 Count the animals—two by two. *What kind of counting is this? What's missing? Take your time, because everyone who gets this page right will get . . .* (How about a special mark or sticker or an extra 5 minutes at recess?)

How many feet do you have? Then how many socks do you need? When the socks match, we call them a PAIR. *How many in a pair?*

Continue with boots, mittens, and so on, until the children understand **pair.** Then ask them to name things that come in pairs. Have 3 children stand. *How many pairs of mittens for this many children? How many mittens is that?* (Count by twos.)

goal Counting by fives to 100

warm-up Practice counting by fives. Have the children alternate counting with you.

Teacher: Five.
Children: Ten.
Teacher: Fifteen.
Children: Twenty.

Switch by letting them begin first.

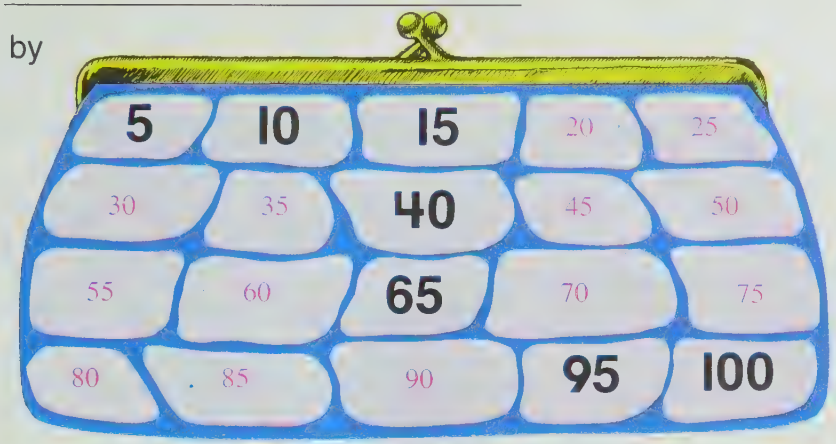
page 196 *Who can find the zero? There it is! What will you do now? Have fun!*

Here's a challenge involving counting by twos. The children clap for each missing number.

Clap, 2, clap, 4, clap, 6, clap, and so on.
Watch out! 1, clap, 3, clap, 5, and so on.
If they're really good, try counting backward.

name _____

Count by fives.



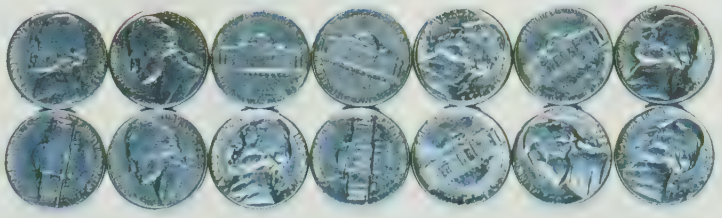
What is this coin?

Penny

What is this coin?

Nickel

Count by fives.
How many cents?



70 cents

© 1974, SRA PURPOSE: Counting by fives.

lesson Pages 197, 198

goal Counting by fives to 100

warm-up Can the children count to 100 by fives? Try them. Set up a chant, using your hands as the signal. Show them one clenched hand. Now open your hand and extend the fingers. *How many?* This is their signal to count by 5. Close your hand. Open again. *That's 5 more. Every time I open my hand, count 5 more.*

How good are they at counting? Try going just to 55. No fair going past. Go just to 70. Are they really good? Start at 20 and go to 45. Start at 35 and go to 90. Watch the last one—it's tricky.

page 197 Have them fill in the chart. Watch for reversals of numbers—youngsters who write 52 for 25, and so on.

Now let's look at a real-world use for counting by fives—counting money, of course! You may need to introduce CENTS and the ¢ symbol. What do we call the COIN that is worth 5 cents? (NICKEL)

goal Counting by tens to 100

memo If counting by tens is a problem, use the hand-finger technique you used for counting by fives. You have to use both hands to show ten, of course. Or you might get out the full ten-trays and practice some more.

page 198 Completing the chart at the top is independent work. Is any child writing 03 for 30? It may be just a silly mistake, or he may need more work with a place-value chart. Check to make sure.

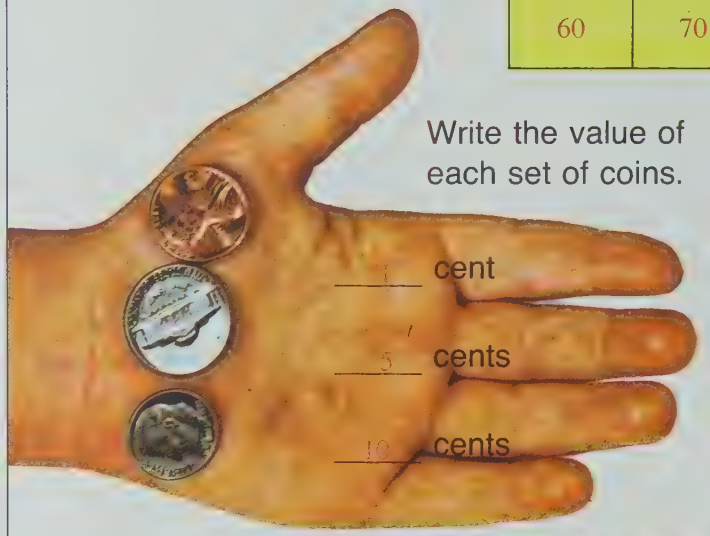
Do we ever count by tens in the real world? Sure, when we count DIMES! How about a little practice with the real thing?

Provide additional counting experiences using coin folders or some of those great-to-receive money-tree birthday cards.

198

Count by tens.

10	20	30	40	50
60	70	80	90	100



Write the value of each set of coins.

1 cent

5 cents

10 cents

Count by tens.
How many cents?

90 cents

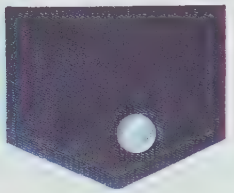
PURPOSE: Recognizing value of coins; counting by tens.

name _____

Write the value of each set of coins.

4 cents

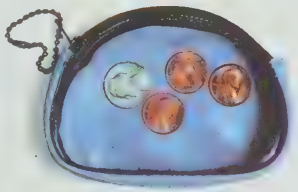
3 cents



10 cents

5 cents

1 cent



8 cents

© 1974, SRA PURPOSE: Practice with money.

lesson Pages 199, 200

goal Practice in counting money

things for each group: (real money)
10 pennies, 10 nickels, 10 dimes

warm-up Group the pupils. Distribute the sets of money. Have them sort the money. Discuss each type of coin. What's on one side? on the other side? What's its color? size? name? VALUE? Make a chart. Leave room for additions.

penny	1 cent
nickel	5 cents
dime	10 cents

Let the children exchange coins—a nickel for 5 pennies; a dime for 2 nickels, a nickel and 5 pennies, or 10 pennies.

Now let's practice counting. Show a nickel and 2 pennies. How much is the nickel worth? Count from 5—6, 7. How much all together? Continue with other sets of coins. Limit the sets to 1 dime or 1 nickel and pennies. Always count from the coin of greatest value.

page 199 Call each coin by its name (penny, nickel, dime). Have the pupils count softly to themselves and write the value. Check by counting together from the first coin.

Extend the page activities. *Who can find out how much money in all is shown on the whole page?*

goal Practice in counting money

things for each group: (real money)
20 pennies, 4 nickels, 2 dimes

warm-up Again group the children. Distribute the sets of coins. Begin with sets having 1 dime **or** 1 nickel and some pennies. Then change to sets having 1 dime **and** 1 nickel with pennies as well. When they have jumped this hurdle, use more than 1 dime or nickel in a set.

page 200 After the Warm-up there should be no problems. Review directions. Children work independently. Check the page by counting together.

If you detect potential problems or the need for more practice, take time out and use the page for another purpose. Have the children use three different colors. Mark all the dimes with one color, all the nickels with another color, and all the pennies with the third color.

How many dimes are pictured on the whole page? How much money are the dimes worth? How many nickels? How much are they worth? How many pennies? How much are the pennies worth?

201

name _____

Write the values. Draw lines to show the same value.

© 1974, SRA PURPOSE: Practice with money.

STOP

things flannel board, felt numerals, play money

Show several numerals on the flannel board (5, 10, 15, 7). Have the children try to show each of these with the play money. Check each set of coins by counting. Continue as long as it's fun.

lesson Pages 201, 202

goal Matching sets of coins that have the same value

things for each group: (real money) 20 pennies, 4 nickels, 2 dimes

warm-up Back to the groups. Distribute the sets of coins. *Show 1 dime and 4 pennies. Count. How many cents? How many pennies? Can we exchange the pennies for any other coin that is worth 4 cents? Can we exchange the dime for any coins that are worth 10 cents?* (1 nickel and 5 pennies, 2 nickels, or 10 pennies.)

As each possibility is discovered, count the value of the new set of coins to make sure it is still 14¢. Continue with more examples until the exchange of different sets of coins that have the same value is well established.

page 201 The page is to be done in two steps

1. Count and write the value of each set of coins.
2. Draw lines to match the sets that have the same value.

goal Solving word problems involving money

page 202 Read and do this page together. Take one step at a time. First find out how much money Al has. Have the children count to themselves and write the answer. Ask one child how he counted. Did anyone count a different way? How many different ways can be found? Is the value always the same?

Now let's help Al spend his money. As each problem is completed and the answer verified, ask how the counting was done. Give the children time to share and explore ideas.

The last question is a real challenge. Don't give hints. Let them work it out. Did anyone mark off the coins that were spent to see which were left? Did anyone count from 22 to 27? Any method that works for them is O.K.

202

How much money did Al have? How much did he spend?

27 ¢

Al bought four fish.
He paid 1 cent for each.
He paid 7 cents for a fish dish.
How much did Al spend?

11 ¢

Al bought some candy.
He paid a nickel and a penny.
How much did he spend for candy?

6 ¢

Al bought a ring. The ring cost a nickel.
How much did Al spend for the ring?

5 ¢

Now how much money did he have?

5 ¢

PURPOSE: Practice with money.

lesson Pages 203, 204

goal Introduction to the quarter

things for each group: (real money) quarters, dimes, nickels, pennies

warm-up Again form groups. Distribute the QUARTERS. Discuss the big coin. What's it called? How much is it worth? What's on one side? on the other side? What color is it? Compare its size value, and color to a penny, nickel, dime. Add **quarter** and **25 cents** to the money chart.

Now distribute the other coins. Have the children exchange the quarter for other coins. Find all the possibilities. Count each time. Is the value 25 cents?

Finally, make sets of a quarter and some other coins—25¢ plus 1¢, 25¢ plus 5¢ (5 pennies as well as 1 nickel), 25¢ plus 10¢ (10 pennies, 2 nickels, 1 nickel and 5 pennies). Encourage counting from the coin of greatest value in the set.

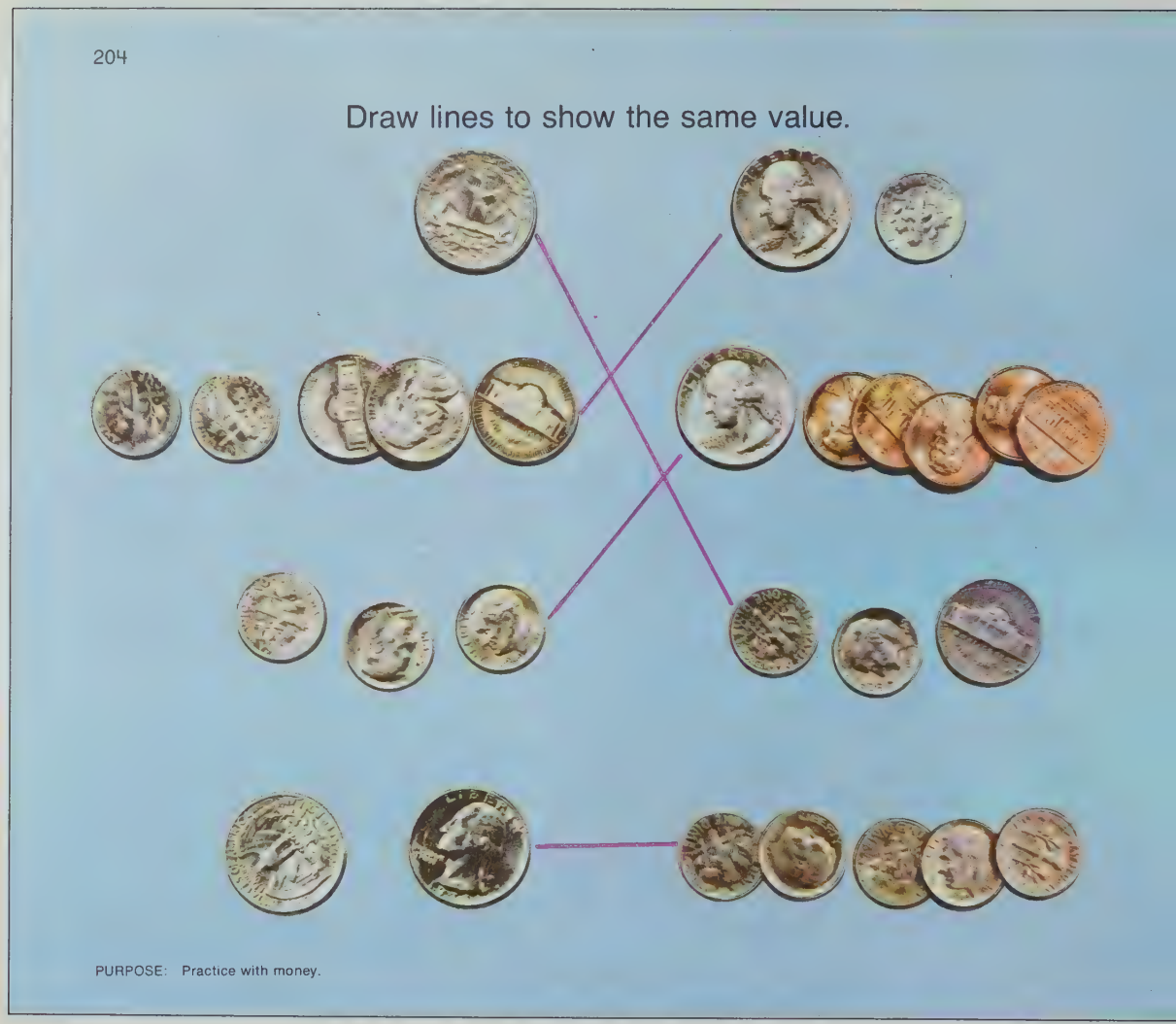
page 203 Have the children search the page and put an orange mark under each picture of a quarter. There should be no problem with directions. The children work independently, but you give help to those who still need it. Check by counting each set of coins. Watch for pupils who can count accurately but have trouble writing the numeral.

goal Matching sets of coins that have the same value

things flannel board
felt numerals and ¢ sign
play money with felt backing

warm-up Display **31¢** on the flannel board. Call on a child to show 31¢ with coins. Can it be done another way? See how many ways the children can find. Repeat with other numbers greater than 25 cents.

page 204 Use this page to determine which children need more practice in counting.



name _____

© 1974, SRA PURPOSE: Progress check—money.

See activity 1, page 218a.

things play or real money, items with price tags attached (pictures on bulletin board)

The child chooses 4 coins, counts them, and tells how much. He then "buys" an item, and counts how much remains.
Challenge some children to return the item for a refund. How much now?

lesson Page 205

goal **Progress check**—counting sets of money

page 205 Once directions are clear, the children work independently. When the page has been checked, go over it together. Be sure to ask how they counted the money.

lesson Page 206

goal Finding how much money is left

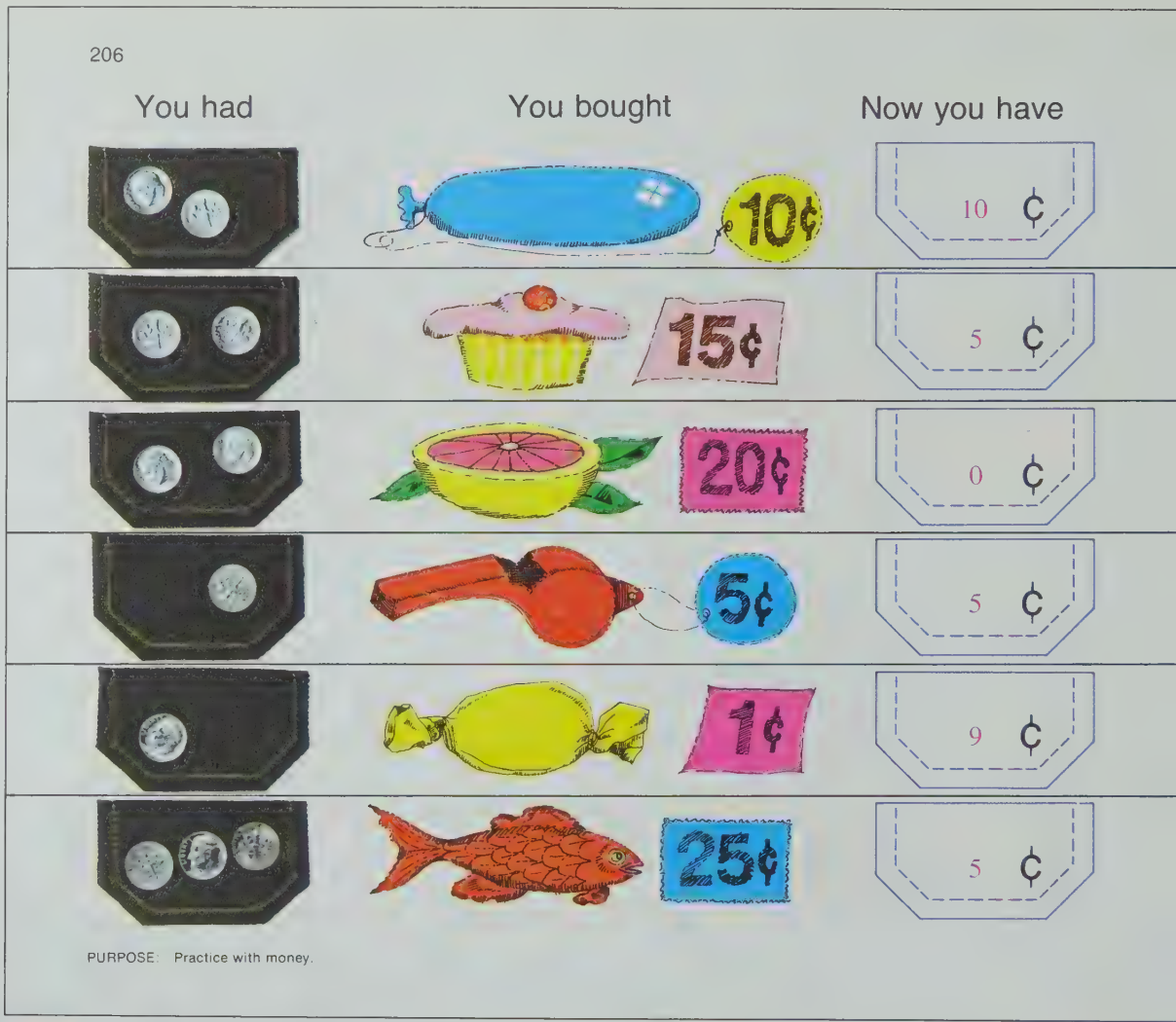
memo Before class, put a price tag on 6 items: 1¢, 5¢, 10¢, 15¢, 20¢, 25¢.

warm-up Show the 1¢ item. *If you had a nickel, would you have enough money to buy this? Would you have any money left? How much?*

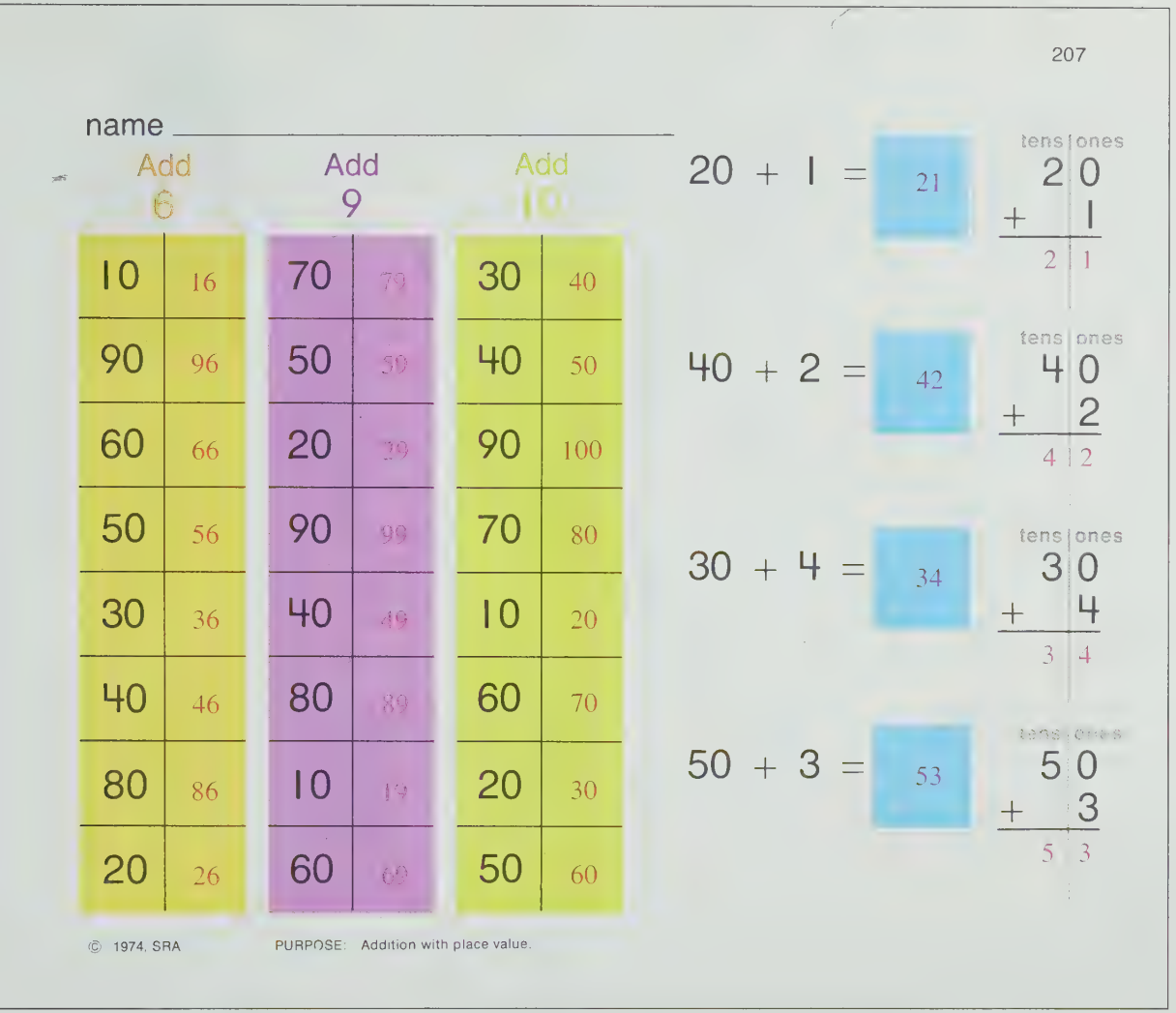
You might have two children act out this little drama to practice counting from a number when returning change. Use play or real money.

Continue through the other items.
You have 5 pennies. You buy a 5¢ item. How much is left?
You have 1 dime, 1 nickel. You buy a 10¢ item. How much is left?
You have 1 quarter. You buy a 20¢ item. How much is left?
Go on as long as the activity is profitable.

page 206 The Warm-up will have identified those children who are ready to work independently and those who need your continued help.



See activity 2, page 218a.



lesson Pages 207, 208

goal Practice in adding ones to a multiple of 10

things ten-trays, counters
for each pupil:
place-value chart, numeral cards

warm-up Show 2 full trays. *Use your charts. Show me how many. What does 2 mean? What does the zero mean?* Show the 2 trays and 3 more counters. *2 full trays and this many more.* Hold up 3 counters. *How many is that? Show me. What does the 2 mean? What does the 3 mean?* Continue with other multiples of ten and ones until the pupils can work easily.

page 207 Begin the first chart together. When they show that they understand, have them complete the three charts.

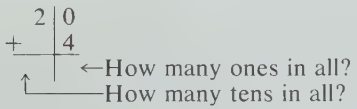
You can use the magic bit again (page 118) to relate the addition sentence to the computational form. Or you can jump right in by reminding the children that this is old stuff—only now we are adding tens and ones.

My goodness—
this is grownup stuff!
Don't they feel smart?

goal Practice in adding tens and ones

memo Here is the first place to be aware of the terrible contradiction in what is expected from children. When they learn to read and write, they start from the left and go to the right. When they count, they generally start at the left and count objects to the right. The one-more pattern and even work with a number sentence reinforce this left-to-right pattern. And now it's time to compute 2-digit numbers. The rules change. **Add the ones; then add the tens.** They have to start from the right and go to left. **Ugh!** Please do it now. This is so important later when they have to rename ones to tens and ones.

page 208 Directions should be no problem. Get them started. First add the ones; then add the tens.



20 plus 4 is 24. Is that the number you wrote?

GOOD

208

Add

tens	ones
2	0
+	4
2	4

tens	ones
3	0
+	1
3	1

tens	ones
5	0
+	5
5	5

tens	ones
4	0
+	8
4	8

tens	ones
7	0
+	6
7	6

tens	ones
3	0
+	9
3	9

tens	ones
8	0
+	2
8	2

tens	ones
7	0
+	4
7	4

tens	ones
4	0
+	7
4	7

tens	ones
9	0
+	2
9	2

tens	ones
7	0
+	8
7	8

tens	ones
6	0
+	3
6	3

tens	ones
6	0
+	9
6	9

tens	ones
9	0
+	9
9	9

PURPOSE: Addition with place value.

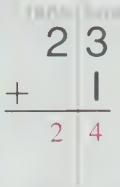
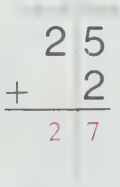
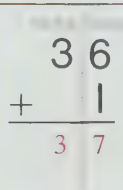
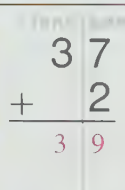
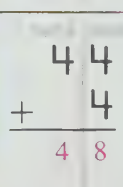
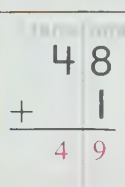
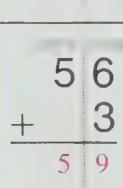
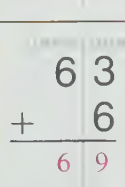
things for each pupil: number strips cut from oaktag, place-value chart, numeral cards

Example:

Use your strips to show 40. Children show four 10-strips below the tens pocket. *Add 3.* Children show one 3-strip below the ones pocket. *Show how many ones with a numeral card in the ones pocket. Now show how many tens with a numeral card. How many in all?* Save the strips. They will be used again.

209

name _____

23 + 1 = 24 	25 + 2 = 27 
36 + 1 = 37 	37 + 2 = 39 
44 + 4 = 48 	48 + 1 = 49 
56 + 3 = 59 	63 + 6 = 69 

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lesson Pages 209, 210

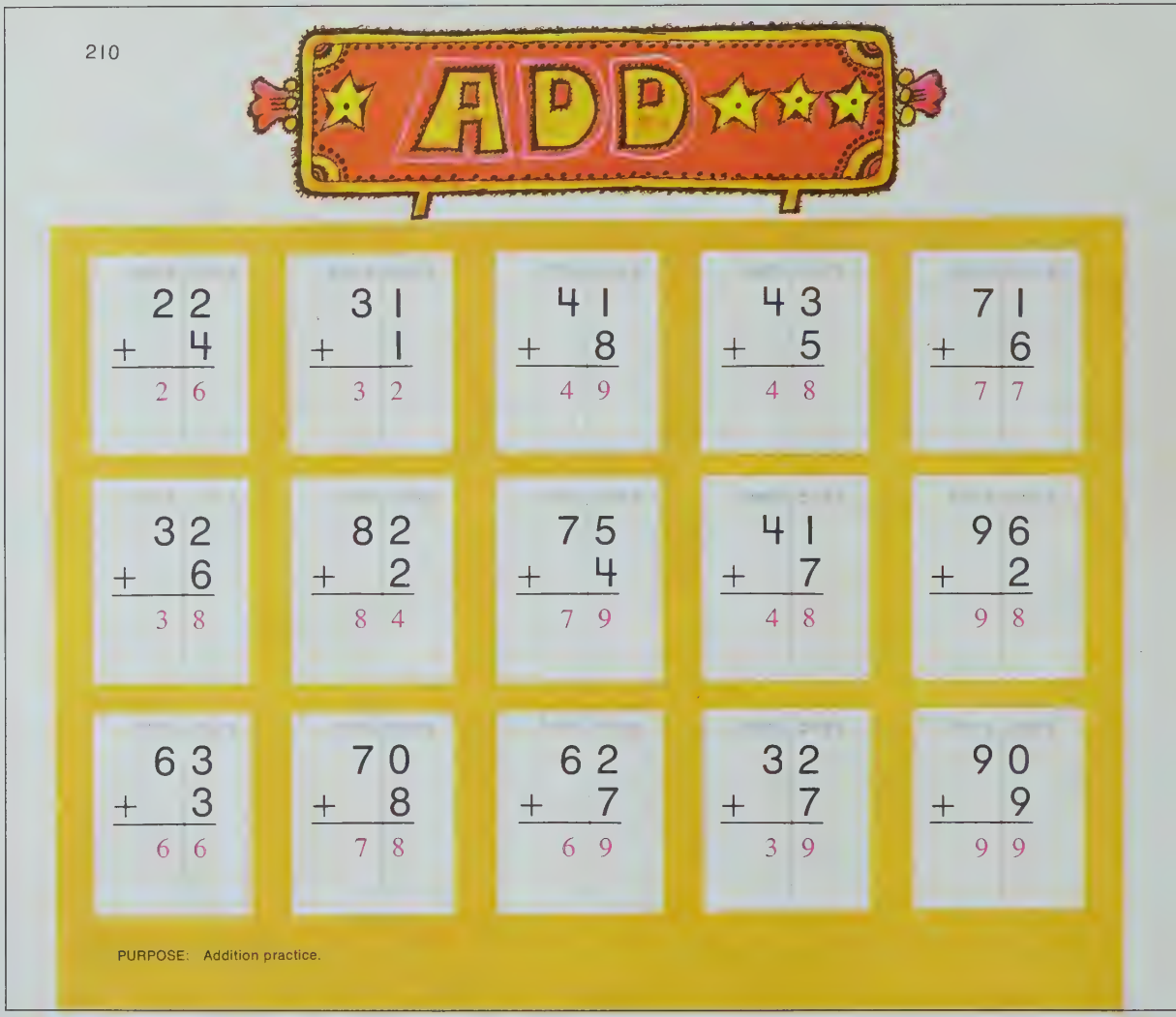
goal Adding a 1-digit number to a 2-digit number, no renaming

warm-up Write on the board: 24 + 1 = ___ *Twenty-four and one more is how many? You're so smart. Try this.* Write on the board a tens|ones model as on the pupil page—without numbers, please. *Twenty-four—how many tens? How many ones? Add one more. Where do we write that? Add the ones. How many? . . . How many tens? Did we get the same answer?* Move quickly through 32 plus 3, 41 plus 4.

page 209 Pupils who worked confidently during the Warm-up should be able to work on their own. Guide the others with questions. If you use ten-trays and counters to check an answer, make sure that the counters outside the tray are counted first. (How many ones?) Then count the full trays. (How many tens?) Finally ask them how many in all.

goal Practice in adding a 1-digit number to a 2-digit number, no renaming

page 210 Take your cues from the children. Are they working confidently? Then let them handle the page independently. Work with those who are unsure. If you use manipulatives, make sure that they count the counters outside the trays first, then the number of full ten-trays. Your sharpies may not need the practice. Don't hesitate to use them as helpers.

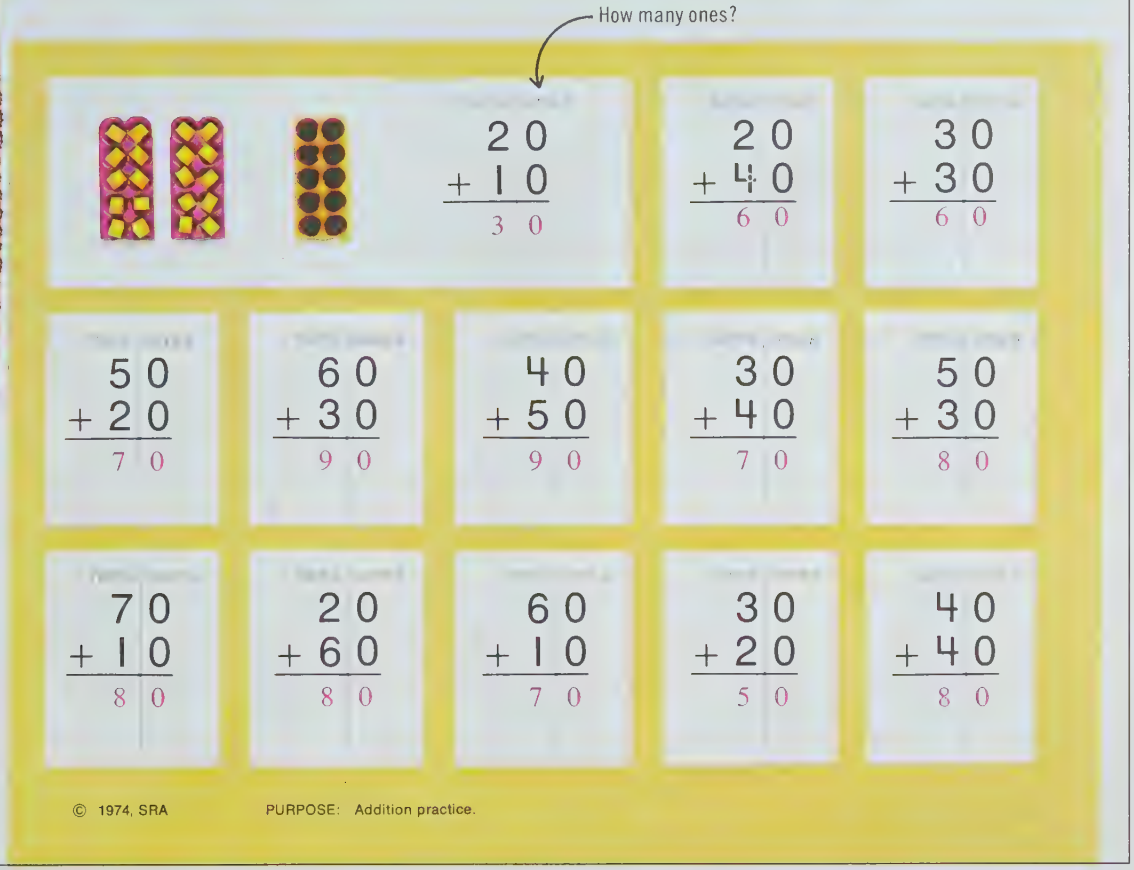


things for each pupil: number strips (activity, page 208), place-value chart, numeral cards

Use your strips to show 33. Children show three 10-strips below the tens pocket and one 3-strip below the ones pocket. *Add 2.* Children show one 2-strip below the ones. *Replace the strips below the ones with a strip as long as these two laid end to end.* Children show a 5-strip.

Have the children tell how many ones with a numeral card in the ones pocket and how many tens with a card in the tens pocket.

name _____



lesson Page 211

goal Adding two multiples of 10

things full ten-trays

warm-up Display 3 full trays on the left of a table and 2 more full trays on the right. Get ready for a wild discussion. *Do you suppose we can write a math problem to show what ten-trays are on the table?* Have volunteers show the problem on the chalkboard. Expect the following:

$30 + 20 = 50$ or $20 + 30 = 50$

$3 + 2 = 5$ **Whoops!** Better discuss this.

3	0	They probably won't use the
+2	0	tens-one heading. Please put
5	0	it on the problem.

Praise them for their good thinking and now take your turn. Write on the board a tens|ones model as on the pupil page. *Who can show the problem 10 + 30? How many ones? How many tens? How many in all?*

page 211 It's independent work as soon as they're able. Watch to make sure that they have only the digit 0 in the ones place. This sounds like nagging, but the computational model is the place to get a good understanding of place value.

lesson Pages 212, 213

goal Adding a multiple of 10 to another 2-digit number

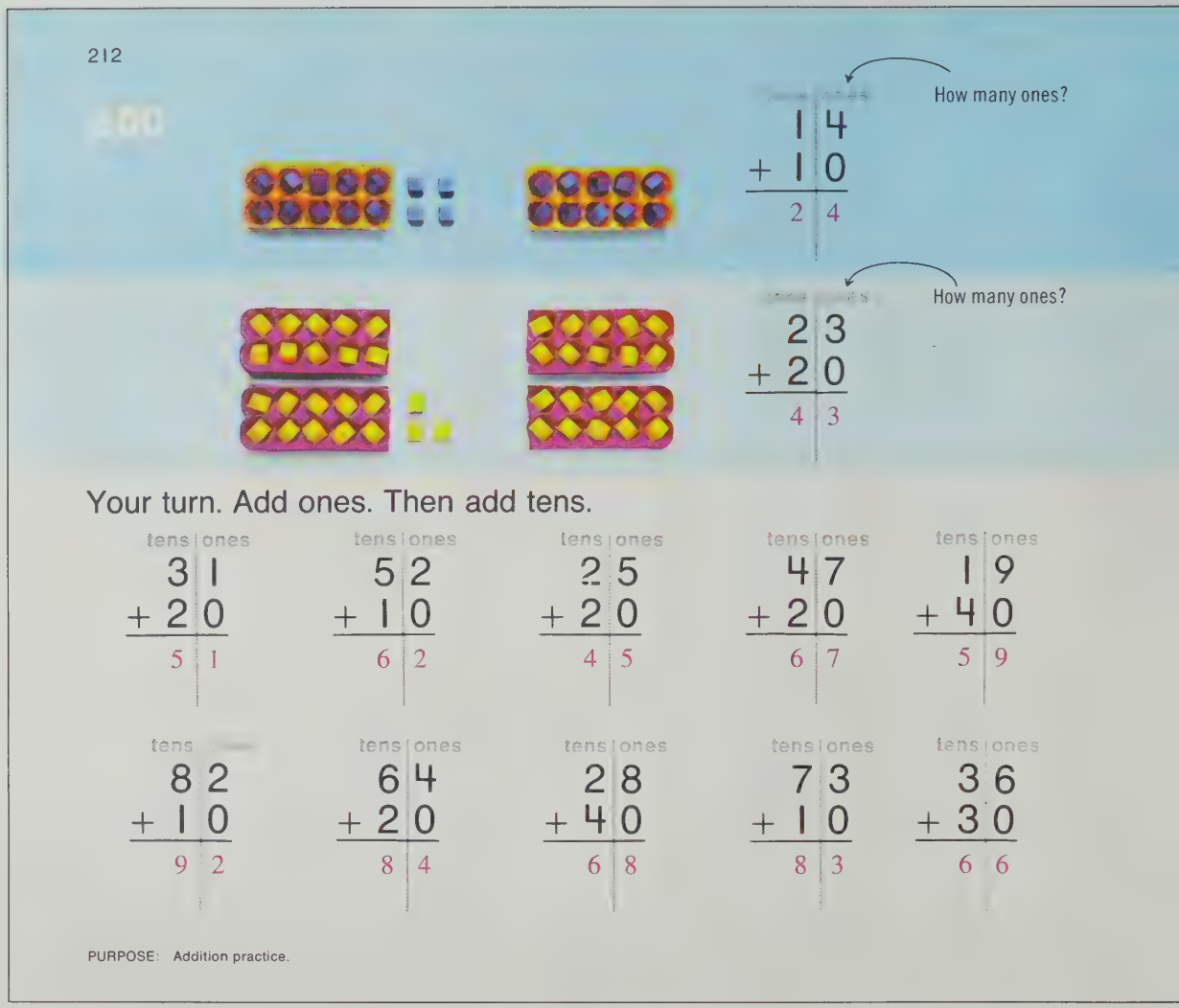
things full ten-trays
extra counters

warm-up Write this form on the board three times: tens|ones
Show 2 full trays and 4 more. Ask a child to record how many tens and how many ones. Show 1 more full tray (no ones). Have this recorded on the board. Add the + sign and horizontal line.

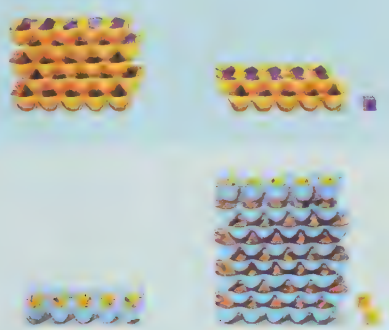
The sign tells us to add. How many all together? Have the answer recorded.

Count the loose counters first, then the full trays to check the answer. Try two more. This is the time for lots of praise.

page 212 Let the children explain the first problem. Why do they think that the arrow is pointing to the ones? They may do the rest of the page by themselves. Have them correct their errors by using ten-trays and counters.



name _____



How many ones?

$$\begin{array}{r} 50 \\ +\ 21 \\ \hline 71 \end{array}$$

How many ones?

$$\begin{array}{r} 10 \\ +\ 82 \\ \hline 92 \end{array}$$

Your turn. Add ones. Then add tens.

$$\begin{array}{r} 50 \\ +\ 43 \\ \hline 93 \end{array} \qquad \begin{array}{r} 20 \\ +\ 21 \\ \hline 41 \end{array} \qquad \begin{array}{r} 10 \\ +\ 67 \\ \hline 77 \end{array} \qquad \begin{array}{r} 70 \\ +\ 28 \\ \hline 98 \end{array} \qquad \begin{array}{r} 40 \\ +\ 42 \\ \hline 82 \end{array}$$

$$\begin{array}{r} 20 \\ +\ 34 \\ \hline 54 \end{array} \qquad \begin{array}{r} 60 \\ +\ 39 \\ \hline 99 \end{array} \qquad \begin{array}{r} 20 \\ +\ 65 \\ \hline 85 \end{array} \qquad \begin{array}{r} 10 \\ +\ 46 \\ \hline 56 \end{array} \qquad \begin{array}{r} 20 \\ +\ 40 \\ \hline 60 \end{array}$$

© 1974, SRA PURPOSE: Addition practice.

goal Adding a 2-digit number to a multiple of 10

memo The children may not think these problems are any different from the ones on page 212. Great! Sure the numbers have been commuted, but there is no need to make a big point of this.

page 213 Work through the first two problems together. Can they tell you what is happening? What does that arrow mean? Let those who can go on by themselves.

lesson Pages 214, 215

goal Solving addition word problems involving a multiple of 10 and a 2-digit number

memo If pupils can compute the correct answer mentally, please, please, please don't make them write a number sentence or the computation model. Always give praise to the person who is consistently good with mental arithmetic.

page 214 Independent readers are on their own—otherwise, please help.

Add a little interest by asking 12 what. He found 12 bugs? pennies? Let the unnamed objects be anything a child wants them to be. Maybe they will want to make a picture story. Let them share their ideas when it's time to check the page.

Do they know how to complete the puzzle? (They might think that the art is a road sign, a target, or a big lollipop.) You may need to talk about what they are supposed to do. Many pupils will need to write each computation problem on a sheet of paper in order to find the answer. Watch for errors in copying the answer from the computation into the answer space on the puzzle.

He found 12.
She found 10.
How many were found? 22

He had 12 .
She had 10.
How many in all? 22

She had 20.
He had 15.
How many in all? 35

She sold 30.
He sold 20.
How many were sold? 50

He bought 30.
She bought 40.
How many were bought? 70

She made 18.
He made 10.
How many were made? 28

Add

PURPOSE: Addition practice.

name _____

ADD

28 + 50 = 78	43 + 30 = 73	24 + 20 = 44	50 + 13 = 63	10 + 16 = 26
65 + 20 = 85	76 + 10 = 86	88 + 10 = 98	59 + 20 = 79	39 + 50 = 89
20 + 59 = 79	70 + 24 = 94	37 + 40 = 77	45 + 50 = 95	20 + 72 = 92

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PURPOSE: Addition practice.

goal Practice in adding a multiple of 10 and a 2-digit number

page 215 They've seen problems like these before. Review adding the ones first, then the tens. Use this page to identify those who may need additional individual help.

things for each pupil: number strips (activity, page 208), place-value chart, numeral cards

Show 20. Children show two 10-strips below the tens pocket. *Add 24.* Children show two 10-strips below the tens pocket and one 4-strip below the ones pocket. *Show how many in all with numeral cards in your chart.* Focus on the ones first. Now have them show 24 first, add 20, and then tell how many.

lesson Pages 216, 217

goal Introduction to adding two 2-digit numbers, no renaming

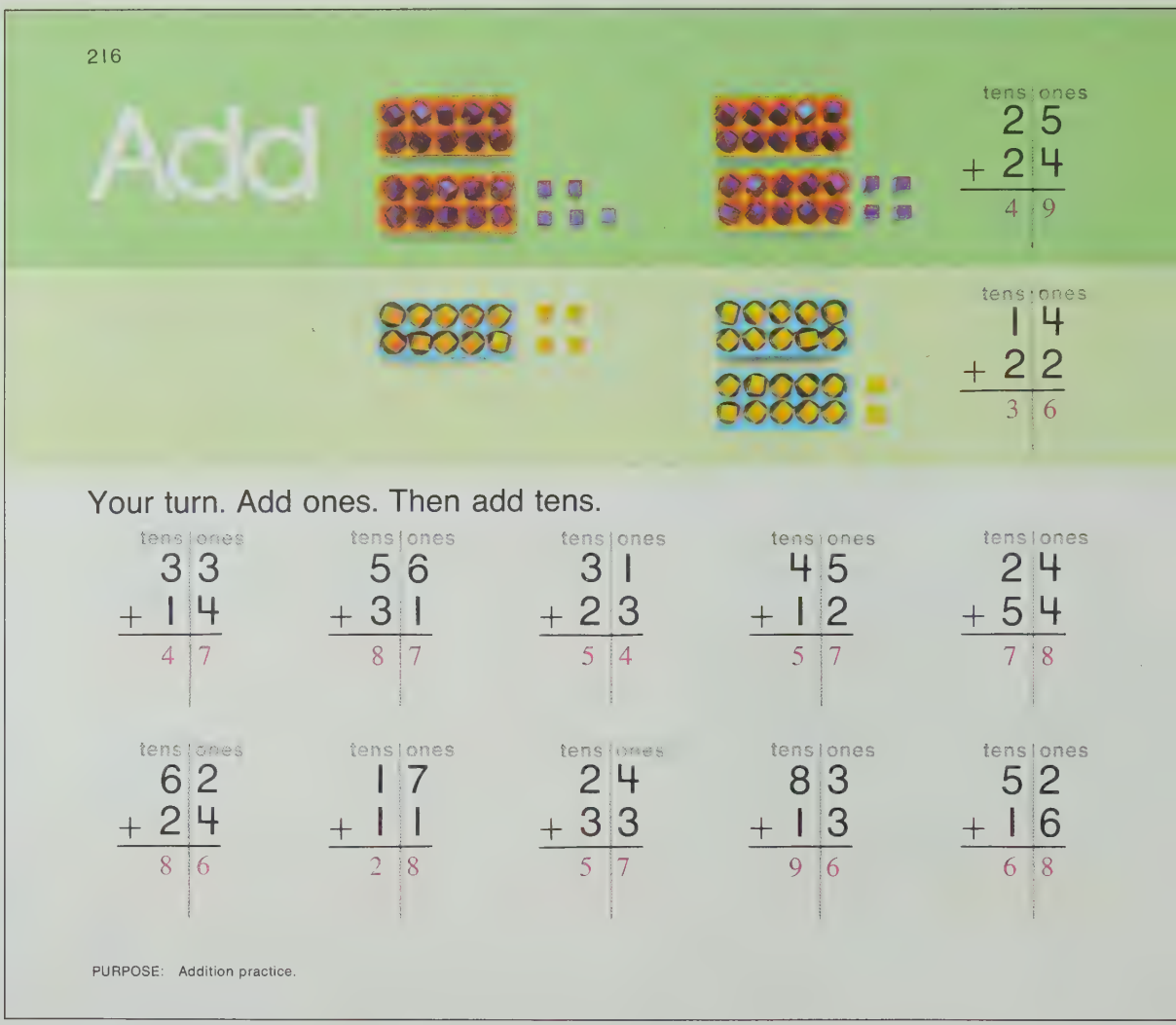
warm-up Write this form on the board four times: tens|ones

How would you write 30 + 20? How do you find the answer? Is that right? What about 22 + 10. How would you write that? How do you find the answer? Who will try 30 + 46? Ask questions. Let them show how smart they are.

Now here's a tough one for you. How would you write 42 + 35? Does anyone think he can find the answer for this one? Let a child do it and explain.

Praise them—
They deserve it.
They've just taken another big step.

page 216 Complete the model problems together. Can they explain what is happening? Use real ten-trays and counters if there is any confusion. Those who are able complete the page independently.

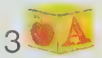


name _____

Bill caught 12
Fred caught 10
How many all together? 22

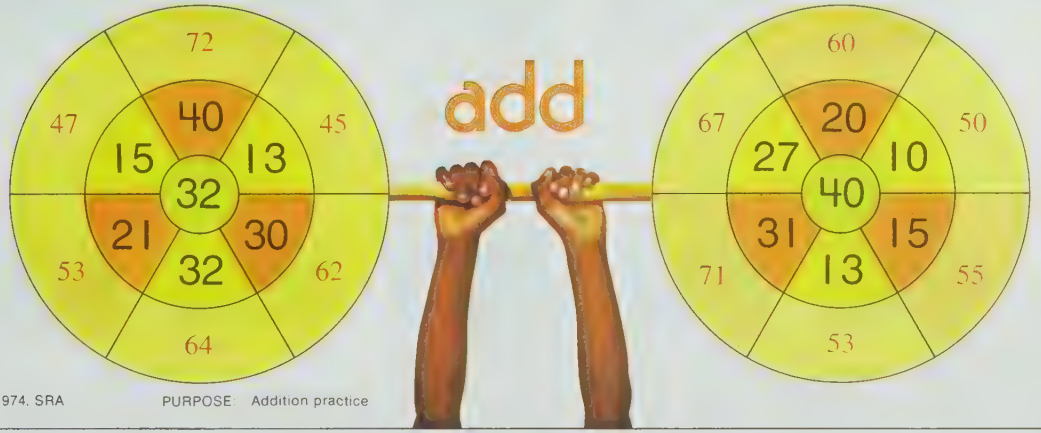
Sue made 18
She made 20 more.
How many did Sue make? 38

One class made 26
Another class made 22.
How many in all? 48

13  on the shelf.
14 more came in.
How many ? 27

June had 24
John had 32.
How many in all? 56

He found 12.
She found 15.
How many were found? 27



© 1974, SRA PURPOSE: Addition practice

goal Practice in solving addition word problems

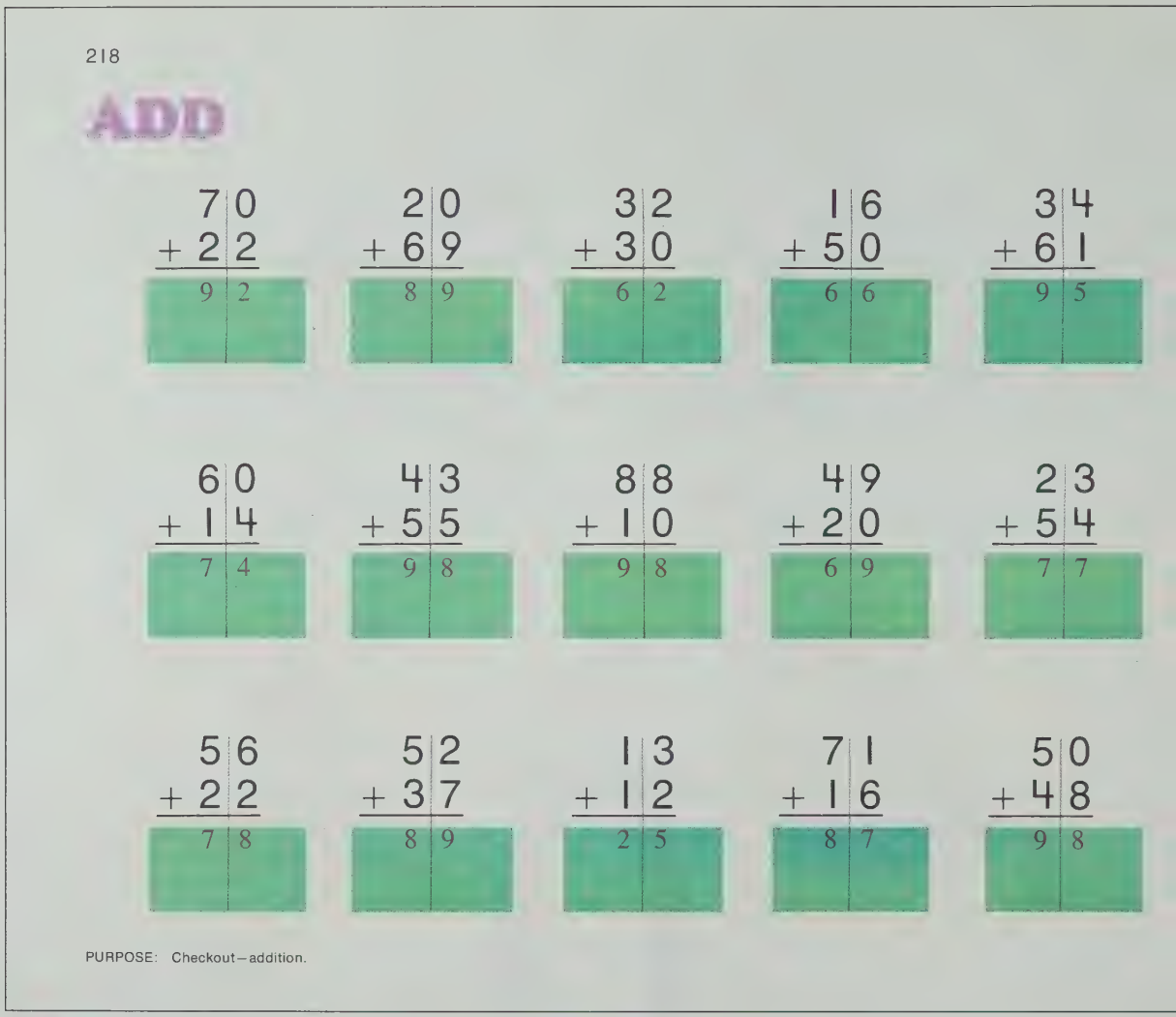
page 217 Same rule as before—independent readers are on their own. Help the others with the reading.

The circle puzzles should cause no problems now. But many will still want to compute the problems on separate paper. That's O.K. They will use mental arithmetic someday.

lesson Page 218

goal **Checkout** —adding two 2-digit numbers, no renaming

page 218 Ask the children if they know what to do. When directions are clear, everyone works independently. No need to mention testing or to set a time limit.



things for each pupil: number strips, place-value chart, numeral cards

Refer to activity suggestions on pages 208, 210, and 215. Apply the same techniques for adding 34 and 22. Careful—focus first on showing how many ones with a numeral card, then on how many tens.

things counters

Pupils work in pairs. One thinks of a 2-digit number. The other reverses the two digits and then adds the two numbers to find the sum. One counter is awarded for each correct answer. Example: 36 +63 Most counters wins.

RESOURCES

another form of evaluation

for progress check—page 205

You will need 2 quarters, 3 dimes, 4 nickels, and 10 pennies.

You keep 1 quarter, 1 dime, 1 nickel, and 5 pennies. The rest of the coins should go to the pupil. Pretend that you are a visitor from another country and you don't know anything about our coins. Ask the name of each coin. Ask what combinations of other coins have the same value as your quarter. The pupil should use his set of coins to show you. Continue for the dime and the nickel. Ask how much money you have. How much money does he have? If you put both of the quarters together, how much money would there be? all the dimes together? all the nickels together? all the pennies?

When you know the trouble spots, combine special help along with the evaluation.

for checkout—page 218

The pupil needs paper and pencil. He writes down a 2-digit number. You write one below it and the pupil finds the answer. Do only ten problems. Don't forget that the sum must be less than 100 and no renaming is allowed.

If it appears that the addition facts are causing the problem, continue to encourage the pupil to use the flash cards whenever he can find someone to help him.

activities

1. things 20 index cards, real money—20 pennies, 4 nickels, 2 dimes

Write 1¢ on the first card, 2¢ on the next, and so on, through 20¢. Shuffle the cards. Pair weak and strong pupils. One child picks a card and then uses the real coins to show the amount given on the card. He challenges the other child to show the same amount with a different set of coins. If this is not possible, he draws a new card and they continue.

2. things gumdrops—several colors, small plastic bags, construction-paper price tags, 1 dime, 2 nickels, 10 pennies

Display bags of candy on a bulletin board. Each bag should contain candy of only one color and a readable price tag. This candy sells by the piece.

Possible verbal activities:

1. You have a nickel. How many red candies can you buy?
2. You have a penny. Can you buy green candy (2¢ each)? How much more money do you need?
3. You have a dime. What do you want to buy? How much must you pay? Will you get any change? How much?
4. You have a dime. You buy 5 candies, all of the same color. What color candy did you buy?
5. You have a nickel. Suppose you buy 1 piece of candy and get 2¢ change. What color candy did you buy?
6. Here's a real challenge! You have 15¢. Suppose you buy 3 candies and get 3¢ change. Are all your candies the same color? What color(s) could they be?

You may want to extend the activity to include recording the sales on the chalkboard.

you have	you buy	you pay	now you have

additional learning aids

concept — chapter objectives 1, 2, and 3

SRA products

Mathematics Involvement Program, SRA (1971)
Cards: 72, 262, 272, 163
Visual Approach to Mathematics, level 1, SRA (1967)
Visual: 17, first suggested activity

other learning aids — (described on page 256g) — Beginners Number Poster Cards (money cards), Flannel Money Pieces, Computing abacus, Unifix (cubes)

operation — chapter objectives 4, 5, and 6

SRA products

Computapes, SRA (1972)
Module 1, Lesson: AS 8
Skill through Patterns, level 1, SRA (1974)
Spirit masters: 34, 35, 36, 37

other learning aids — 1 Win (sets 1 and 2), Mini Veri-Tech, Orbiting the Earth (addition), Quizmo (add-subtract)

letter to parents

Dear Parents,

Take your child with you the next time you go to the store to buy something that costs less than a dollar. Let him have the coin purse. Let him pay the cashier. He should know what coins to use.

He has been working hard on addition. He can add any two 2-digit numbers if there isn't any renaming (carrying). Let him show you that he can do problems like this:

$$\begin{array}{r} 25 \\ +\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 52 \\ +\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 30 \\ +\ 60 \\ \hline \end{array} \qquad \begin{array}{r} 40 \\ +\ 40 \\ \hline \end{array} \qquad \begin{array}{r} 53 \\ +\ 34 \\ \hline \end{array} \qquad \begin{array}{r} 67 \\ +\ 21 \\ \hline \end{array}$$

The light lines are a reminder that he adds the numbers in the ones place first, and then adds the numbers in the tens place. This type of problem shows why it is so important to know the addition facts.

Between now and the end of the year we will be finding out what a fractional number is and how to write it. If you are using a measuring cup while your child is around, it would be helpful if you would think out loud about the fractional parts of a cup you are using. And share your thinking with your child the next time you cut a pizza, a cake, or a pie.

We will be going back to learn some more about subtraction. We will be practicing on the "hard" combinations such as 17–8, 15–9, 16–7. You can help your child make flash cards, but please don't put too much pressure on him to learn all the combinations right now. The addition facts are still more important for this year.

We will end the work in this book with a review of everything we have studied. Your child will be proud of himself and will have every reason to be.

11 CONCEPT OF FRACTIONS

before this chapter the pupil has—

Experienced sharing something with someone

in chapter 11 the pupil is—

1. Recognizing less than a whole
2. Recognizing and naming fractional parts (halves, fourths, eighths)
3. Writing fractions

in later chapters the pupil will—

Say and write the fraction associated with marked parts of a region divided into halves, fourths, or eighths (in level 2)

Notes & Things

This exploratory chapter on fractions does not show many everyday situations that involve fractions. That may seem contradictory when, in the past, so much emphasis was placed on children's experiences. There is a very good reason for showing accurately drawn regions rather than apple pies. We want the notion of same-size parts to be as obvious as possible. This is a brand-new concept. Yet we know that probably every child has complained because someone else got the bigger half of the candy bar. We can tease older children about the bigger half or challenge them to figure out when $\frac{1}{2}$ does not equal $\frac{1}{2}$. But these beginners need a straight story if we want them to understand the mathematical concept and its related notation. Even so, you can have lots of fun in class discussion talking about the applications of this math idea.

Your key questions for this chapter: How many same-size parts are shaded? How many same-size parts in all?

words

Concept-development words and phrases introduced in this chapter are listed in the order in which they are used orally. Those words that also appear on pupil pages are marked with*.

whole
same-size parts*
one-half*
fraction
one-fourth*

things

You may want to duplicate the fractional regions shown on page 225b for additional practice. The children can use crayons on white paper. If you use construction paper of different colors, then this can be a cut-and-paste activity.

name _____

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PURPOSE: Introduction to fractions.

lesson Pages 219, 220

goal **Survey** – knowledge and understanding of fractions

page 219 Discuss with the children what it is they see. Listen especially for their use of half, equal, and fraction. If any of these are used, ask what they mean.

What happened to the cupcake? Why would someone do that? Which piece would you want? Why?

How much milk is in the glass? What could have happened to the rest of it? How much more milk would you need to fill the glass?

If you had a real cupcake cut like this, could you eat the WHOLE *cupcake? What does it mean to have a whole cupcake? a whole apple? a whole glass of milk?*

goal Introduction to fractional parts

things 2 same-size pieces of paper about the size of a candy bar

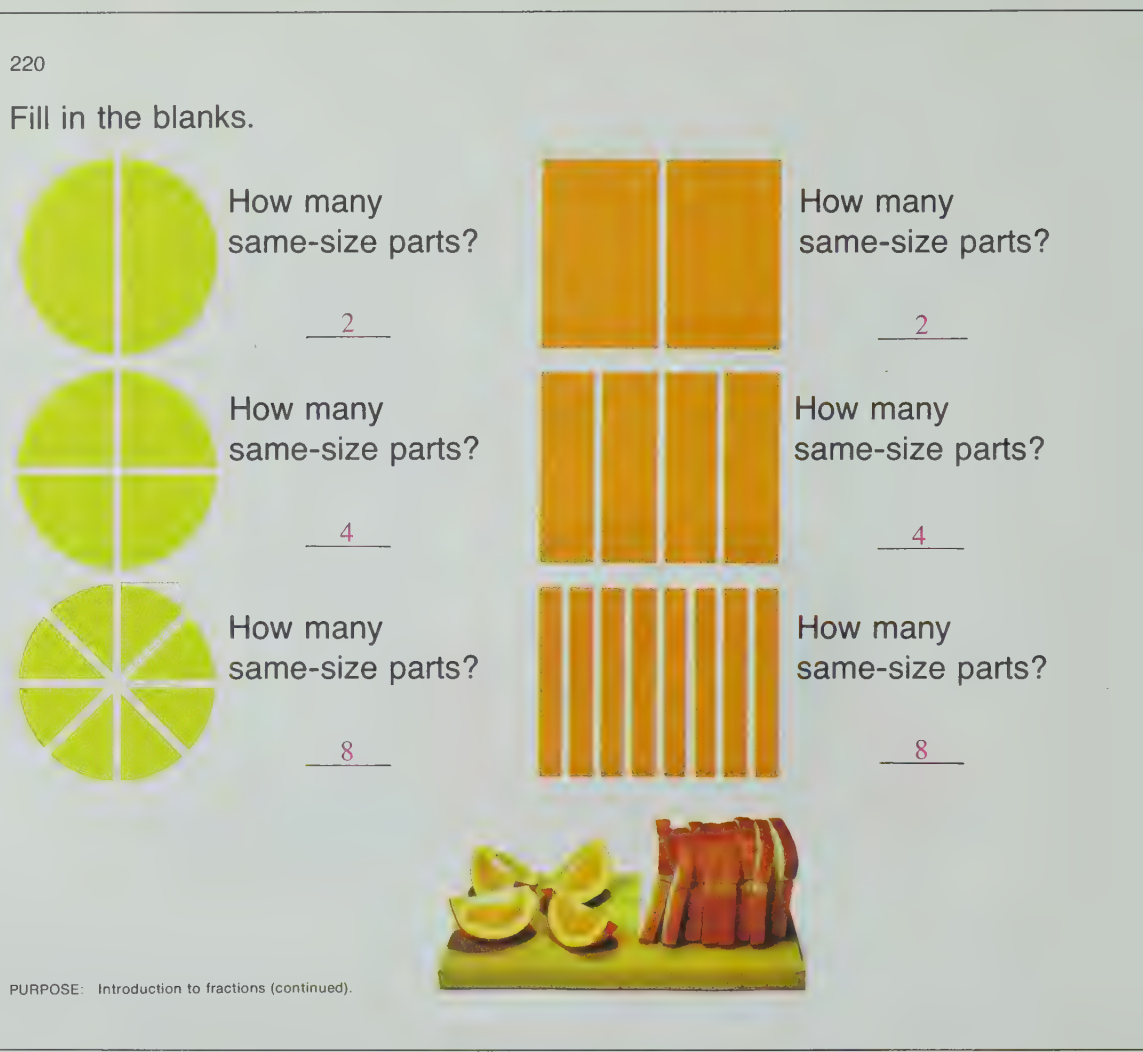
warm-up Use one piece of paper. *Make believe this is your favorite candy bar, and you must share it with a friend.* Cut the paper in two, making 1 piece larger. *Which piece would you choose? What would be the fairest way to share the candy bar?*

Does anyone use SAME SIZE or HALF? If so, ask what it means. Make a big deal of folding the other piece so that the ends meet exactly. Cut. Match the pieces. Let everyone see that the pieces are the same size.

One piece is the ***same size*** *as the other. Would this make your friend happier about sharing? Why?*

page 220 A do-together page. *Look at the 3* CIRCULAR SHAPES (REGIONS). *In which one are the* PARTS *the smallest?* (One with 8 parts) *Is each of the 8 parts the same size? Which one has the largest parts? Is each of the 2 parts the same size?*

The art at the bottom can provide more discussion. Use these questions if you wish. *What kind of fruit is that? It has been divided into how many same-size pieces? How many people could each have a piece? Could 2 people share the pieces and get the same amount?*



name _____

How many are shaded? 1

How many in all? 2

How many are shaded? 1

How many in all? 4

How many are shaded? 1

How many in all? 8

How many are shaded? 1

How many in all? 2

How many are shaded? 1

How many in all? 4

Fill in the blanks.

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PURPOSE: More on fractions.

lesson Page 221

goal Getting ready to name fractional parts

memo Be careful not to move too quickly through these pages. The ideas are very grownup. We're just exploring—building a foundation of correct ideas.

warm-up Draw a circle and a rectangle on the board. Show one with 2 same-size parts, the other with 4 same-size parts. Then discuss each.

How many same-size parts? Shade 1 part. *What have I done to one of the parts? How many parts are* ***shaded****? How many in all?*

page 221 Another do-together page! Summarize it with questions. *Which one has the smallest parts? Which one of the circular shapes (regions) has the largest parts?*

We're getting them ready to see that $\frac{1}{8}$ of one object is smaller than $\frac{1}{2}$ of the same object.

Once again, the art can be the source of additional discussion, focusing on the children's everyday experiences with fractional parts.

lesson Page 222

goal Getting ready to write fractions

page 222 Begin together. When—or if—the children's responses show that they are ready to go on alone, let them.

What shapes do you see on this page? Do they look like they are all the same size? Does each shape have the same number of same-size parts?

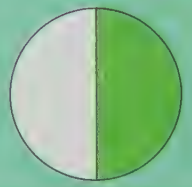
Look at the parts in the first shape. Are they the same size? How many are shaded? How many are there in all? If someone asked you how much was shaded, you could say 1 of 2 parts is shaded.

If you are a ham, now is the time to "discover" that you have given away the answers to the first questions.

Continue. With each illustration, question whether the parts are all the same size. Emphasize the third question. *One of _____ parts is shaded. Is that right?*

222

Fill in the blanks.



How many are shaded? 1

How many are there in all? 2

How much is shaded? 1 of 2

How many are shaded? 1

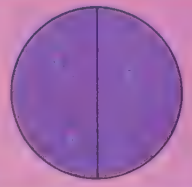
How many are there in all? 4

How much is shaded? 1 of 4

How many are shaded? 1

How many are there in all? 8

How much is shaded? 1 of 8



How many are shaded? _____

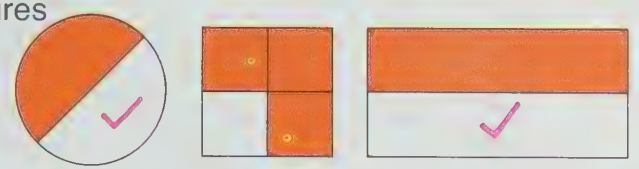
How many are there in all? _____

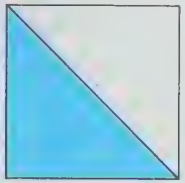
How much is shaded? _____ of _____

PURPOSE: Readiness for fraction notation.

name _____

Use ✓ to mark the pictures that show one half.

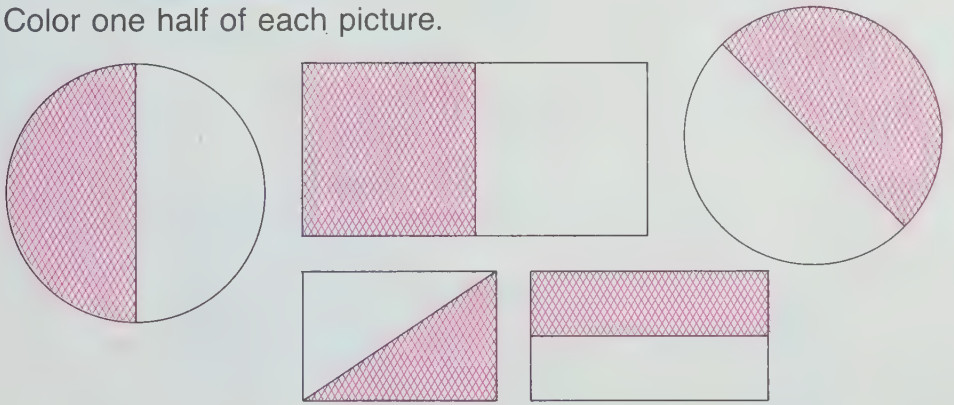




How many are shaded?

How many in all?

Color one half of each picture.



© 1974, SRA PURPOSE: Introduction to one-half.

lesson Page 223

goal Introduction to the fraction one half

page 223 *Let's make sure that the book is right. These first pictures are supposed to show 1 of 2 parts colored. Put a ✓ inside any picture that shows* ONE HALF *of a shape shaded a different color from the other half of the shape.*

Write a 1 over a 2 in proper position on the chalkboard. Point to the 1. *Was 1 part shaded in each one you checked?* Point to the 2. *Did each shape have 2 same-size parts? Look! That 1 and 2 are in the book, but there is a line between the numbers. This line is very special.* Make a line on the board. *It tells you that this is a* FRACTION. *Trace the line to finish your fraction. Is one half of the square shaded?*

What does the 1 mean? What does the 2 mean? What does the line between mean?

They shouldn't have any trouble coloring to show $\frac{1}{2}$ of each of the regions.

Now go back. Ask how much of each picture is not colored. Counting how much for each of the regions will let you give the pupils the needed writing practice.

things 1 large apple, 1 small apple, 1 large can, 1 small can

Cut the large apple into halves. Name each part. Cut the small apple into halves. *How much of the apple is each part? Which one of all the halves would you like most to have? Why?*

Take a large can and a small can. Pretend that they are filled with candy. *You can have half. From which can would you like to have half?*

lesson Page 224

goal Introduction to the fraction one fourth

page 224 *Find the largest shape at the top. It has been divided into how many same-size parts? How many are shaded? Find the circular shape. How many same-size parts? Does the other shape have 1 of 4 parts shaded? Put a ✓ inside each shape that has* ONE FOURTH *shaded.*

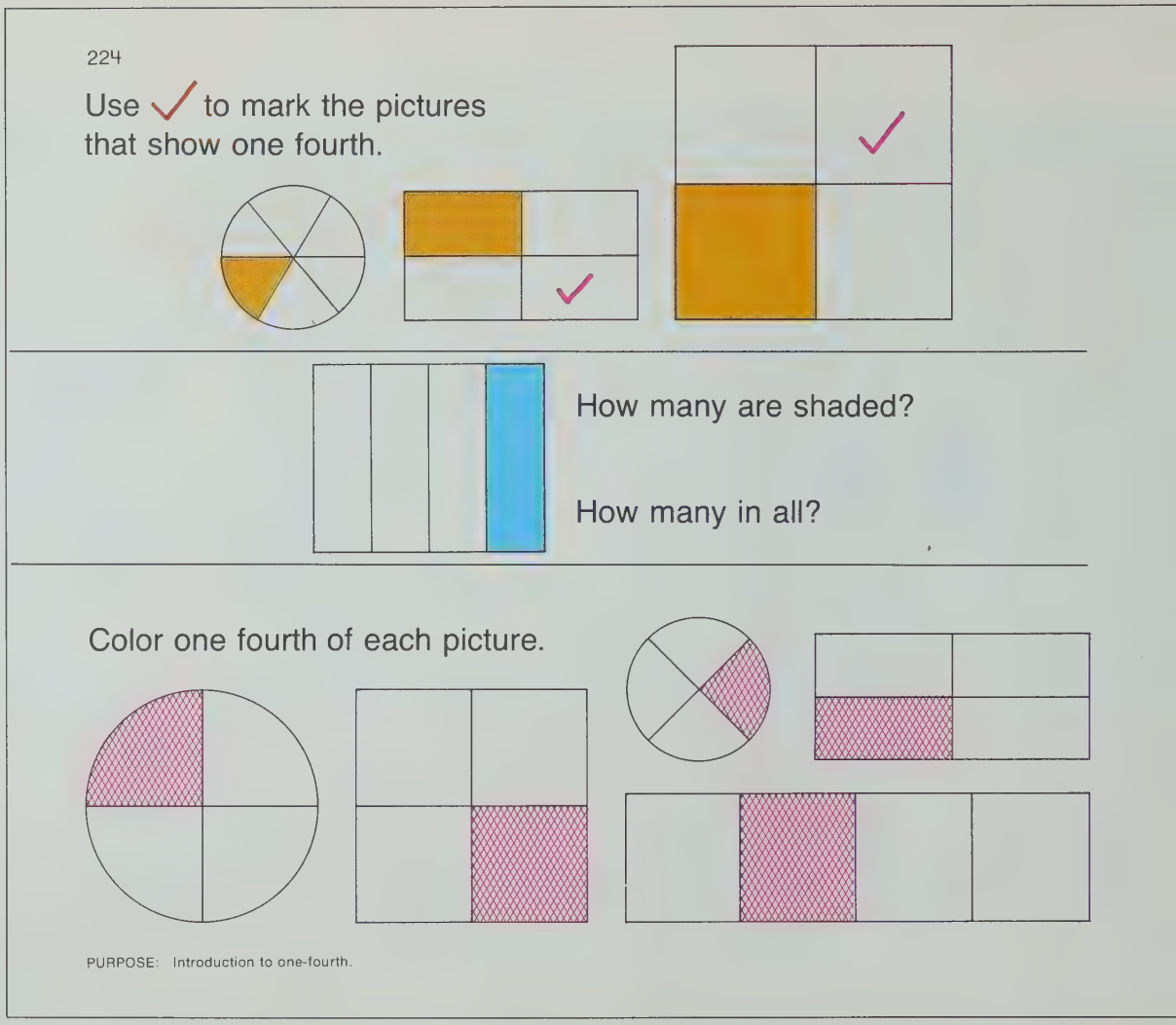
How can we write that 1 of 4 parts is shaded? Trace the fraction $\frac{1}{4}$. *Is one fourth of the shape shaded?*

After they have completed the coloring at the bottom, draw a model to show $\frac{1}{2}$ and another model of the same size and shape to show $\frac{1}{4}$. Discuss how the pictures are different and how the fractions are different. Emphasize what the parts of the written symbol mean.

Go back to the page. Find the largest circle. How much of the circle did you color? Color 1 more of the 4 parts. Look at the whole circle. How much is shaded now? (TWO FOURTHS) If someone answers $\frac{1}{4}$, review what the top and bottom numbers of the fraction mean. The answer $\frac{1}{2}$ is right but rephrase the question "How many fourths?"

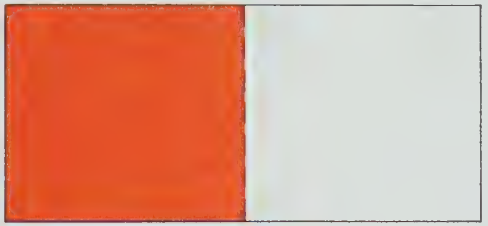
Continue. Color in 1 more of the 4 parts. Get the name THREE FOURTHS for this fraction.

Repeat with other regions to get the necessary understanding of fraction notation.


224
Use ✓ to mark the pictures that show one fourth.
How many are shaded?
How many in all?
Color one fourth of each picture.
PURPOSE: Introduction to one-fourth.

name _____

Fill in the blanks and the boxes.



How many are shaded? 1

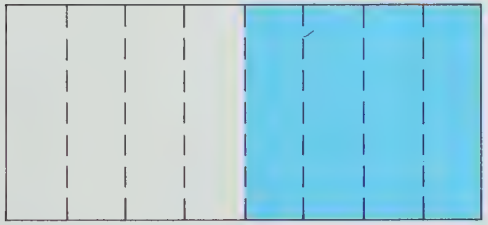
How many are there in all? 2

How much is shaded? 1/2

How many are shaded? 2

How many are there in all? 4

How much is shaded? 2/4



How many are shaded? 4

How many are there in all? 8

How much is shaded? 4/8

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PURPOSE: Checkout—writing fractions.

See activity 1, page 225a.

See activity 2, page 225a.

lesson Page 225

goal **Checkout** – writing fractions

warm-up Draw a square, a rectangle, and a circle on the board. Divide the square and circle into fourths, the rectangle into eighths. Shade in $\frac{2}{4}$, $\frac{3}{4}$, and $\frac{3}{8}$. Write next to each figure the following questions:

How many shaded?
How many are there in all?
How much is shaded?

I'll need some really good thinkers now. What's different? (More than 1 same-size part is shaded.) *Let's see how we can write how much is shaded in each picture.* Answer the three questions for each figure. *Now how do you suppose we read these fractions?*

page 225 *Gee! More problems like the ones we have been doing. Put on your thinking caps and do a really good job.*

RESOURCES

another form of evaluation

for checkout—page 225

You will need your flannel board and fractional-part pieces. Use the circular region; it's usually easier for the child.

Since there is no specific learning that is expected of the pupil at the end of this level, let this second evaluation be extremely casual. He should sort out the fractional-part pieces. Can he fit them together to make one whole circular region? Can he name how much of the region is shown by just one part? Let him sort out other same-size parts and see if he can fit those together to make another whole circular region. Give him some help if necessary. Everyone must leave the fraction chapter with a positive feeling.

activities

1. things for each pupil: 2 same-size pieces of paper

Distribute 1 piece of paper to each. *How can we fold our papers so that we will get 2 same-size parts?* Give help! *Unfold your paper. Are the parts the same size? Does anyone know a name for 1 part of his paper? Write it on your paper. What is the other part called? Write it.*

Let's pretend that this is a candy bar. Would you rather have one-half a candy bar or a whole candy bar? Why? Shade one-half of your paper.

Hand out a second piece of paper to each child. Get them to fold it into 4 same-size parts. Have them write the fraction $\frac{1}{4}$ in each part and then shade 1 of the 4 parts.

Hold up the first paper. *Is half of this paper shaded?* Hold up the second paper. *Is half of this paper shaded? Why not? What does one-half mean?* (1 of 2 same-size parts) *What does one-fourth mean?*

2. Trace 4 rectangles on the board. *I had a cake just for myself.*

A friend came, and I cut the cake to share it with him. This is my piece. Shade 1 piece.

Two more friends came, and we cut the cake again to share it with them. This is my piece now. Shade 1 piece. *What's happening to the size of my piece?*

Four more friends came. You guessed. We cut the cake some more. Look at my piece now. Shade 1 piece. *How many people? How many pieces?*

What happened to my piece as I shared with more and more friends? Do I get a larger piece when I share with 1 friend or with many friends? What size would my piece be if I shared a cake with everyone in the room?

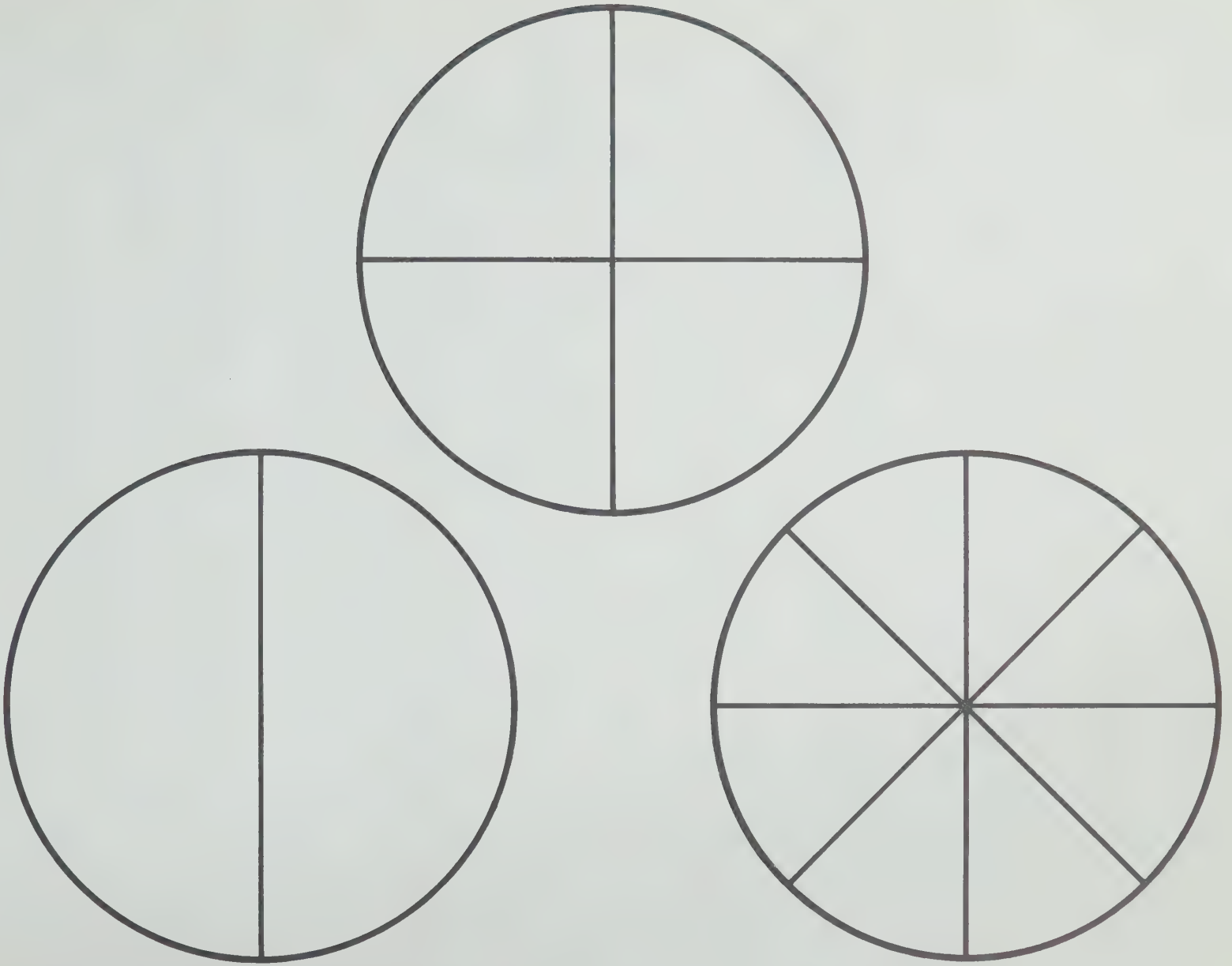
additional learning aids

concept—chapter objectives 1 and 2

SRA products

Skill through Patterns, level 1, SRA (1974)
Spirit master: 38
Visual Approach to Mathematics, level 1, SRA (1967)
Visual: 19, parts 1, 2, and 3 of all suggested activities

other learning aids—(described on page 256g)—Fraction Circles, Fraction Squares, Geometric puzzles and geoboards, Visual Fraction Apparatus



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12 MORE SUBTRACTION

before this chapter the pupil has—

1. Practiced addition facts with sums through 18
2. Practiced subtracting from numbers less than 10
3. Solved word problems using addition or subtraction

in chapter 12 the pupil is—

1. Using subtraction to compare two sets
2. Solving word problems using addition or subtraction
3. Relating subtraction to addition
4. Subtracting from sets of ten through eighteen
5. Practicing subtraction facts

in later chapters the pupil will—

Say and write the difference for any subtraction fact written in horizontal or vertical form (in level 2)

Notes & Things

The concept of subtraction was first presented as a way to find out how many remain when some number has been taken away from the original number. In this chapter subtraction is used to compare two sets. There is no need to talk about "a different kind of subtraction" with the pupils. (They wouldn't understand if you did.) You will notice that the chapter starts with some word problems. It is interesting to observe how many subtraction story problems are comparison situations. (No wonder children have so much trouble with word problems when we pay so little attention to the kind of subtraction that is involved in the problems.)

Comparison situations mean that some matching will be used.

I have 4 dimes. You have 3 dimes. How many more dimes do I have than you have?

mine ○ ○ ○ ○

Aha! I have 1 more.

yours ○ ○ ○

You can have lots of fun with individual pupils by using story problems and matching counters to find an answer.

This chapter does feature a lot of practice with the harder subtraction facts. Don't expect every child to give you an automatic answer to a subtraction fact, but do let it be a very real learning goal for most of them.

There is a very brief exploration of subtracting numbers other than the combinations. The children will probably be delightfully surprised to find how easy subtraction is. What a great attitude to leave with the children as they finish up this level's work.

words

Can you believe there are no new concept-development words for this chapter?!

things

the overhead projector or flannel board
counters
symbol and numeral cards
ten-trays

lesson Pages 226, 227

goal Introduction to subtraction to compare two sets

things flannel board or overhead projector
for each pupil: counters

warm-up Review the subtraction facts.

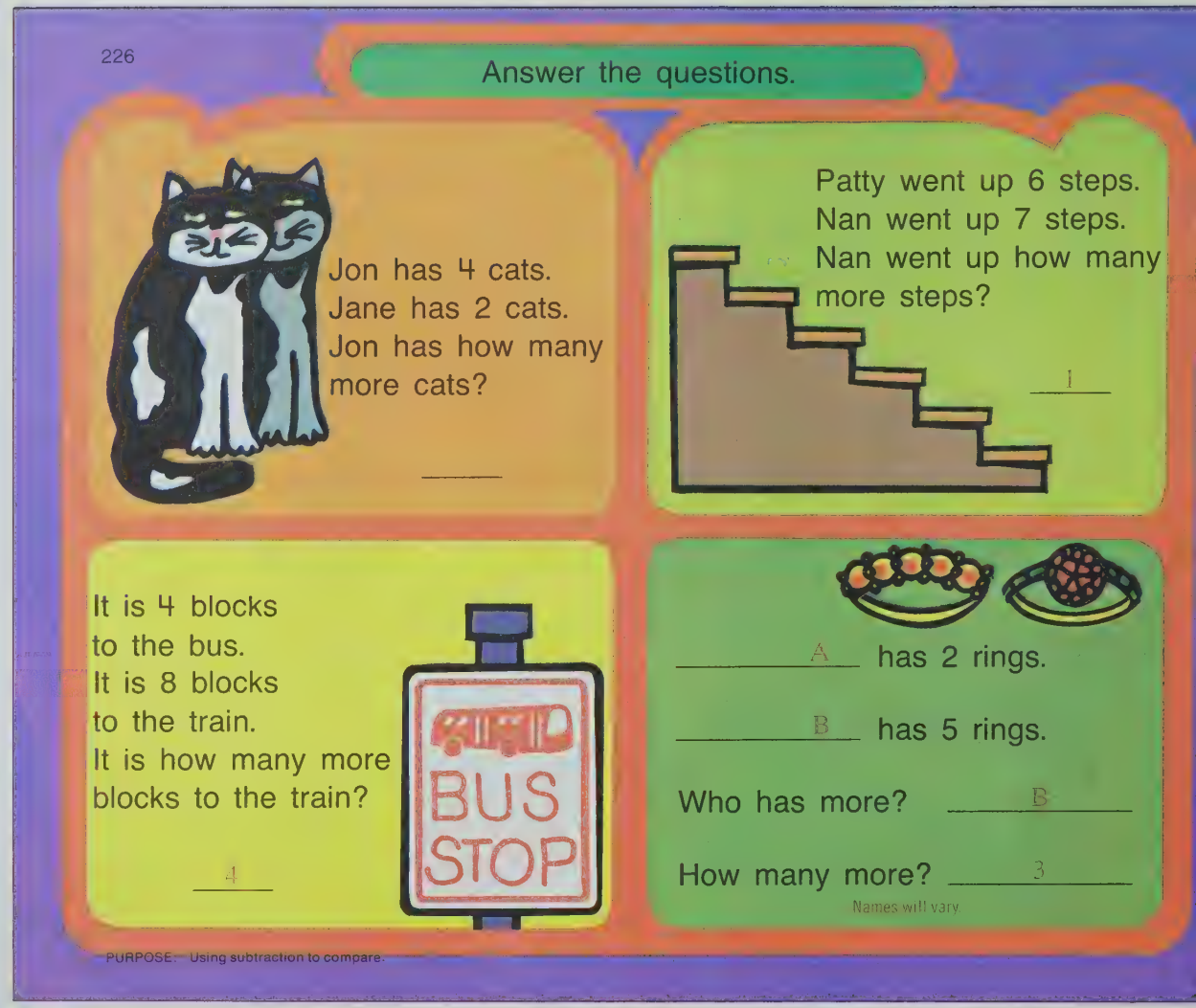
It's been a long time!

page 226 Read the first story together. Illustrate it on the flannel board. Place the objects so that visual matching will be simple X X X X
X X

Which set has more? How many more? Let the children match one to one. *Which set has less? How many less?*

Continue with the same procedure. Let them use counters to illustrate the sets.

The last problem will let everybody get into the act. They may use their own name and another they probably won't know how to spell, or they can draw a picture of the people if they would rather. Why not have the children make up some more problems like this?


226
Answer the questions.
Jon has 4 cats.
Jane has 2 cats.
Jon has how many more cats?
Patty went up 6 steps.
Nan went up 7 steps.
Nan went up how many more steps?
1
It is 4 blocks to the bus.
It is 8 blocks to the train.
It is how many more blocks to the train?
4
BUS STOP
A has 2 rings.
B has 5 rings.
Who has more? B
How many more? 3
Names will vary.
PURPOSE: Using subtraction to compare.

things 8 paper cups, 5 straws

The child is to put 1 straw in each cup, then tell whether he has more cups or more straws and how many more of either. Use other numbers of straws and cups for additional practice. Include 8 cups and 8 straws.

name _____

Fill in the blanks.

How many ▲ ? 5

How many ● ? 3

How many more ▲ ? 2

5 − 3 = 2

How many ▲ ? 7

How many ■ ? 4

How many more ▲ ? 3

7 − 4 = 3

How many ● ? 9

How many ■ ? 8

How many more ● ? 1

Your turn to write the sentence.

9 − 8 = 1

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PURPOSE: Using subtraction to compare sets.

goal Using subtraction to compare two sets

page 227 The sets are **not** arranged in a way that makes visual matching very easy. Some children will have to draw lines for the matching if they can't see the difference.

Begin together. Let those who can go on by themselves. Be careful of the last problem. They must write a complete sentence.

lesson Pages 228, 229

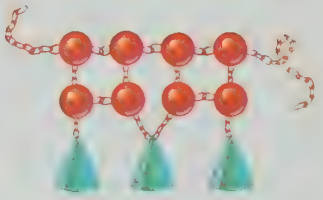
goal Using subtraction to compare sets

warm-up Pick 2 people to come to the front. *Put both hands behind your back. Decide how many fingers you are going to show. O.K. Hands over your head. Who has the most fingers up? How many more?* If there is trouble getting the answer, then match the fingers. Call up 2 more and repeat this activity. Continue as long as it is fast and fun, but no longer, please.

page 228 Children may draw lines to match sets if this is helpful. When directions are clear, let them work independently. Check together.

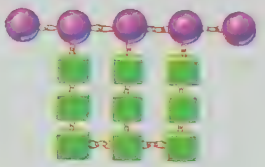
228

Fill in the blanks.



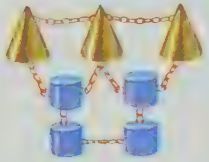
How many more ? 5

8 − 3 = 5



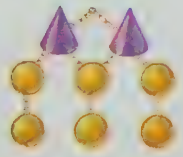
How many more ? 4

9 − 5 = 4



How many more ? 1

4 − 3 = 1



How many more ? 4

6 − 2 = 4

PURPOSE: Using subtraction to compare sets.

things number strips 1 through 9

Number strips can be made from oaktag and each strip colored differently.

Place a 5-strip on a table.

Place a 3-strip under it.

Ask how many more squares are in the 5-strip. (The 3-strip can also be placed on the 5-strip to make the comparison.) Continue with other comparisons.

name _____ Complete.

The plane has	5 tires	2 motors	4 seats
The car has	4 tires	1 motor	2 seats
Which has more?	plane	plane	plane
How many more?	1	1	2
The cat has	4 legs	1 tail	0 wings
The bug has	6 legs	0 tails	2 wings
Which has more?	bug	cat	bug
How many more?	2	1	2
Don has	6	8	9
Jan has	5	3	8
Who has more?	Don	Don	Don
How many more?	1	5	1

Objects chosen will vary

You make up a problem like these.

© 1974, SRA PURPOSE: Using subtraction to compare sets.

goal Using subtraction to compare sets

things counters

warm-up By now the children should understand how to use subtraction to compare two sets. This is an excellent time to review counting from a number to find out how helpful it is when you subtract. All they have to do to find the answer is to count from the smaller number to the larger.

page 229 Slow and easy! This page has a lot of problems on it. Take one at a time until everyone understands. It looks as if these are subtraction problems that are set up and ready to compute. Some are, some aren't. "Which has more?" is a very important question.

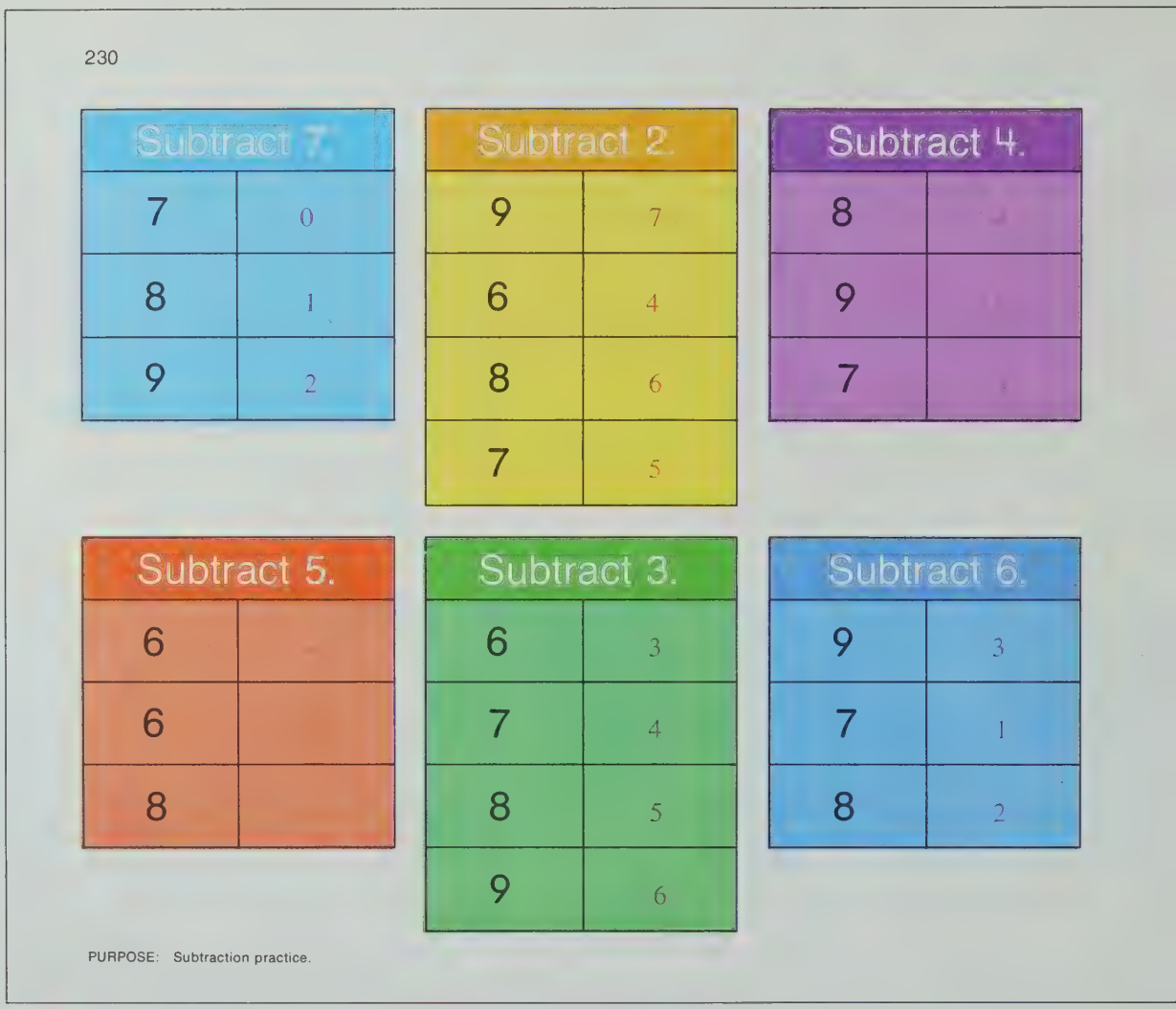
Take plenty of time to use counters and ask questions. Focus on counting from the lesser number to the greater number. Let the more capable finish by themselves. Take the others through step by step. Have fun with finishing up the stories in the last row.

lesson Pages 230, 231

goal Review of and practice with subtraction facts

page 230 *You've used this kind of chart for addition. Can anyone think how we can use it for subtraction?*

Complete the first chart together. Encourage mental computation, but there is space enough to write the problem if necessary. When directions are clear, children work independently. Use this page to identify the youngsters who need more subtraction practice—perhaps with counters or with flash cards. You might have them make flash cards for the facts they missed.



See activity 1, page 245a.

name _____

Complete.

I have I dog.
I have 6 cats.
I have how many more cats? 5

Ned has 7 cans of pop.
Nell has 9.
Nell has how many more? 2

Jack ran 6 blocks.
Jill ran 6 blocks.
Jill ran how many more blocks? 0

8 lamps are on.
3 lamps are off.
How many more are on? 5

© 1974, SRA

PURPOSE: Solving subtraction word problems.

goal Solving subtraction word problems

things for each pupil:
−, =, and numeral cards

page 231 *This is a tricky page, so be very careful!*

Read the first problem together. Have each child try to solve it on his own.

How many more cats? How did you decide that? With your cards, try to make a subtraction sentence. What sentence did you make?

How many had 1 − 6? Have them use counters to show why this won't work. Have them write the correct sentence on the line below the problem. Use the same procedure to complete the page. Finding the solution is quite enough. If they can make a sentence too, they're really superstars!

lesson Pages 232, 233

goal Relating subtraction to addition

things for each pupil: counters

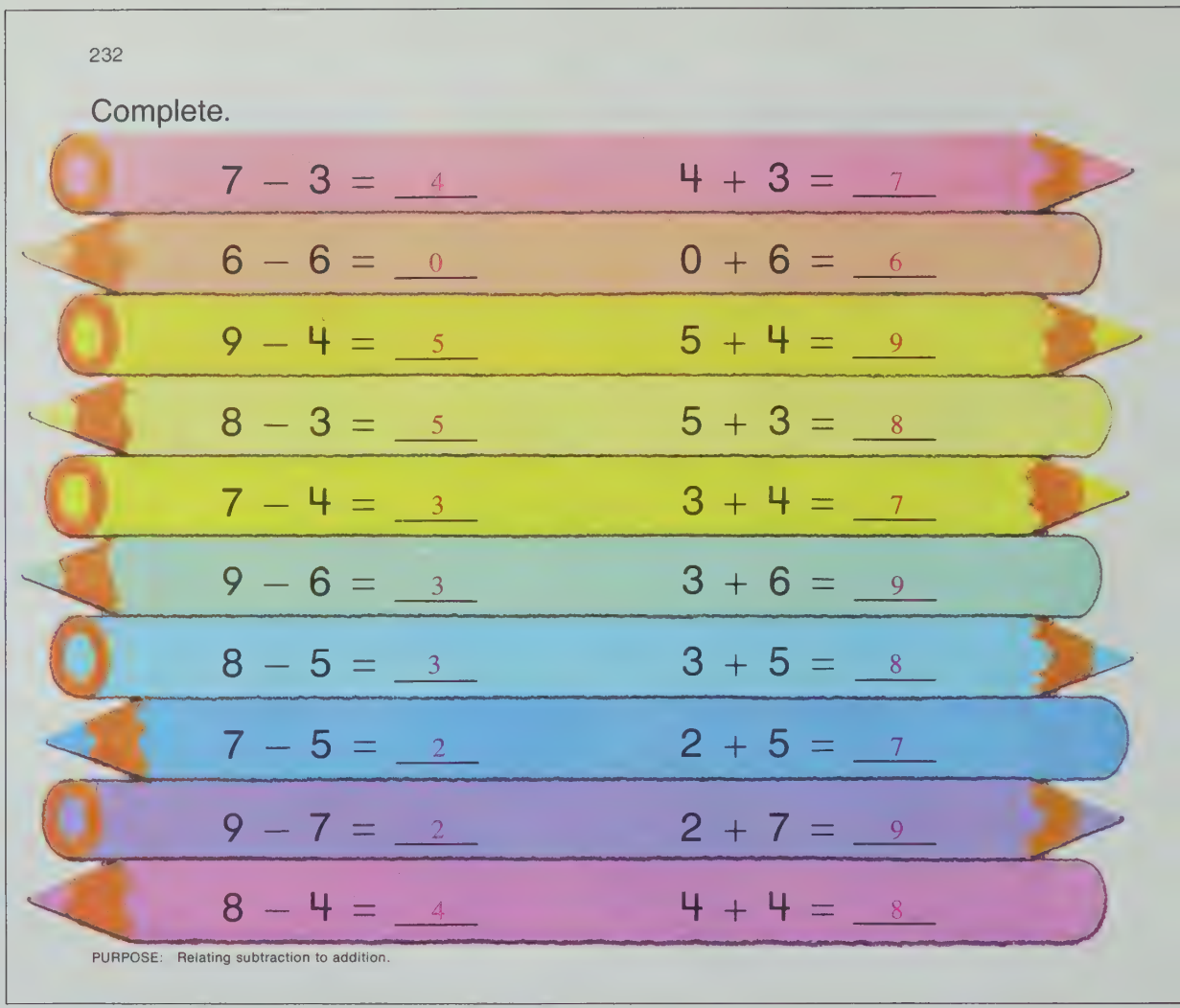
warm-up Have the sentences that result from the activity recorded on the board.

With your counters, show a set of 8. Push a set of 3 aside. How many remain? Can anyone write a sentence to tell what happened? (8 − 3 = 5) Slowly move the set of 3 back. *Can anyone write a sentence to tell what happened?* (5 + 3 = 8)

Show a set of 9. Push a set of 6 to one side. What can we write? (9 − 6 = 3) *Push the sets together again. What sentence tells that?* (3 + 6 = 9)

page 232 *My, there are a lot of problems on this page! But they really aren't very hard—especially if you discover the secret. Complete the first subtraction problem. Now do the first addition problem. If you find the secret, don't tell. Keep it to yourself. Use your counters if you need to.*

They may need to complete 1 or 2 more pairs of problems before they see the pattern.

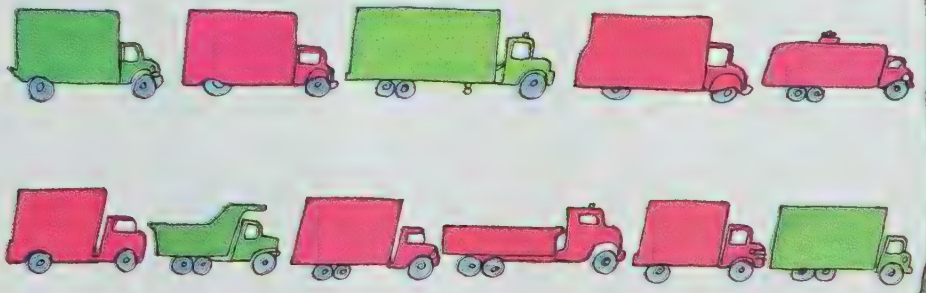


name _____

Answer the question in each story.

High up in a tree climbs my friend Ted.
He sees 4 green trucks and 7 red.
How many trucks are below Ted's head? 11

From Ted's tree, down below
He sees 11 trucks in a row.
Some are red and 4 are green.
How many red trucks can be seen? 7



© 1974, SRA PURPOSE: Practice in addition and subtraction; solving word problems.

See activity 2, page 245a.

goal Solving word problems using addition or subtraction

page 233 Let the children work as independently as possible. Don't let the words get in the way. Help with the reading if necessary. Use this page to find out which children know when to use addition or subtraction. When checking, have the children explain the how and why of doing each one.

Did anyone find the answer in a different way?

Make sure that the answer is correct before the youngster explains how he solved the problem.

The first problem can be changed to get some new problems.

High up in a tree climbs my friend Sue.
She sees 2 white trucks and 9 blue.
How many trucks are below Sue's shoe?

High up in a tree climbs my friend Dean.
He sees 5 pink trucks and 7 green.
How many trucks are in Dean's scene?

Or Dwight, white, sight. Sure it's corny, but it might be fun too.

lesson Pages 234, 235

goal Introduction to subtracting from sets of 10 through 18, using a ten-tray model (the harder subtraction facts)

things for each small group:
2 ten-trays
20 counters

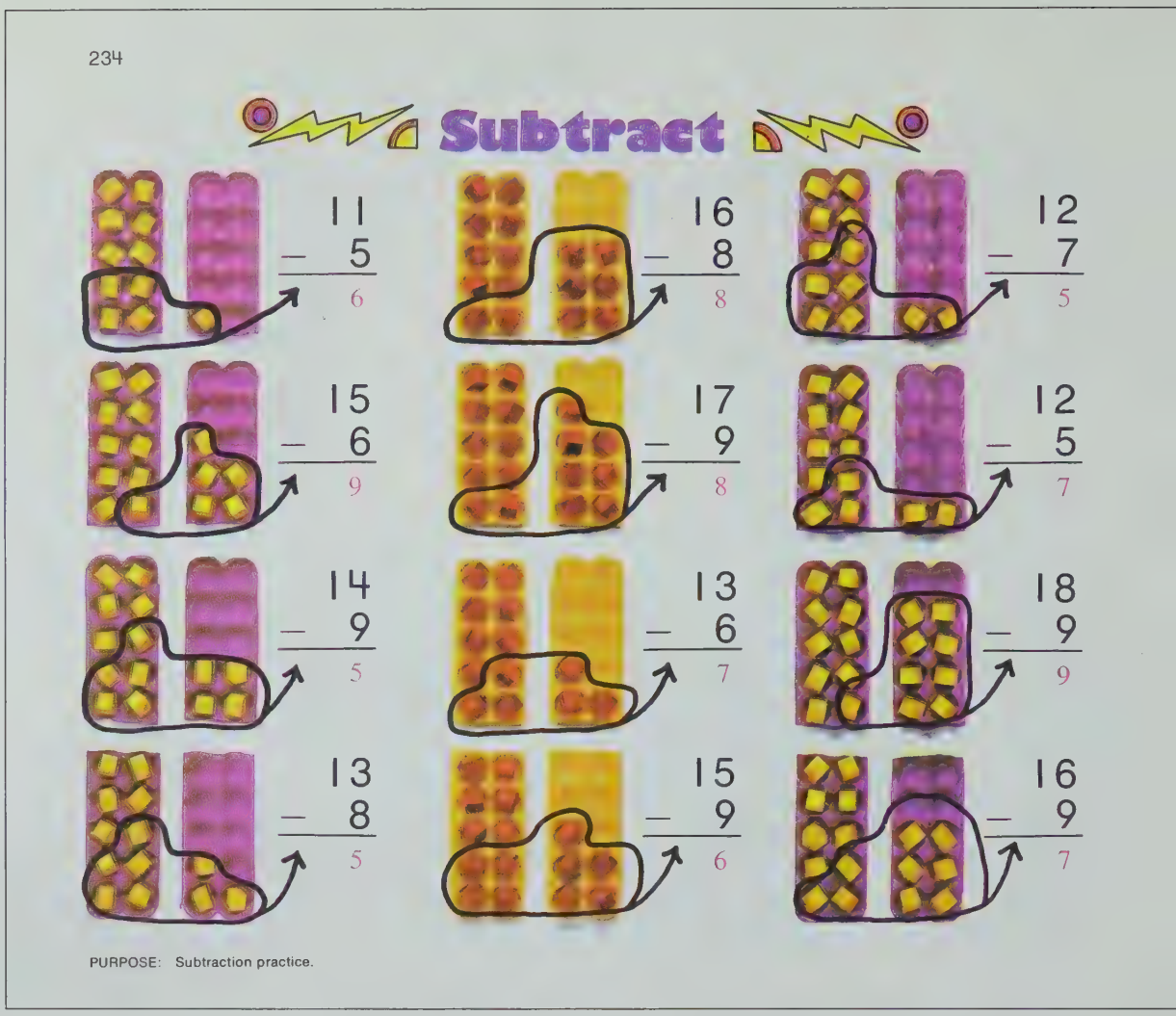
warm-up Have children work in small groups with trays and counters.

We're moving into the big time in subtraction. Show 16 counters in your ten-trays. Remember to fill a tray before you start a new one. How many in the full tray? How many in the other? Write how many in all on the board. *Take away 9.* Record on the board. *How many are left?* Record the answer.

Encourage them to remove counters from the partially full tray first before using the full tray. This approach will prove helpful when renaming is introduced later in the program. Repeat with 17 − 8.

page 234 *What is happening on this page? What do the loop and arrow tell you? Do you have a full ten-tray remaining? What does remain?*

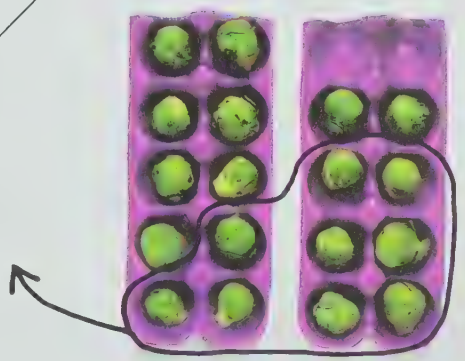
When directions are clear, children work independently.



name _____

Subtract

10 − 5 = 5	11 − 5 = 6	12 − 5 = 7	13 − 5 = 8	14 − 5 = 9
12 − 6 = 6	13 − 6 = 7	14 − 6 = 8	15 − 6 = 9	18 − 9 = 9
14 − 7 = 7	15 − 7 = 8	16 − 7 = 9		
16 − 8 = 8	17 − 8 = 9			



© 1974, SRA PURPOSE: Subtraction practice.

goal Practice with subtraction facts

memo Hopefully, the patterns on this page will make some of the pupils aware of a technique that might help them remember some hard facts. They can use a fact that they know, such as $12 - 5 = 7$, to get the answer to $13 - 5$. It's almost impossible to verbalize this gimmick to children. But maybe they will catch on with lots of experience.

things ten-trays and counters for those who need them

page 235 *This page sure looks different! When you finish working, you'll know why.*

Discuss the example together. When directions are clear, children work independently. They may use ten-trays, counters, or marks to count from a number.

After checking, look for patterns. Guide them to look at the rows, the columns, and the diagonals. *Did anyone use a pattern to help find the answers? How?*

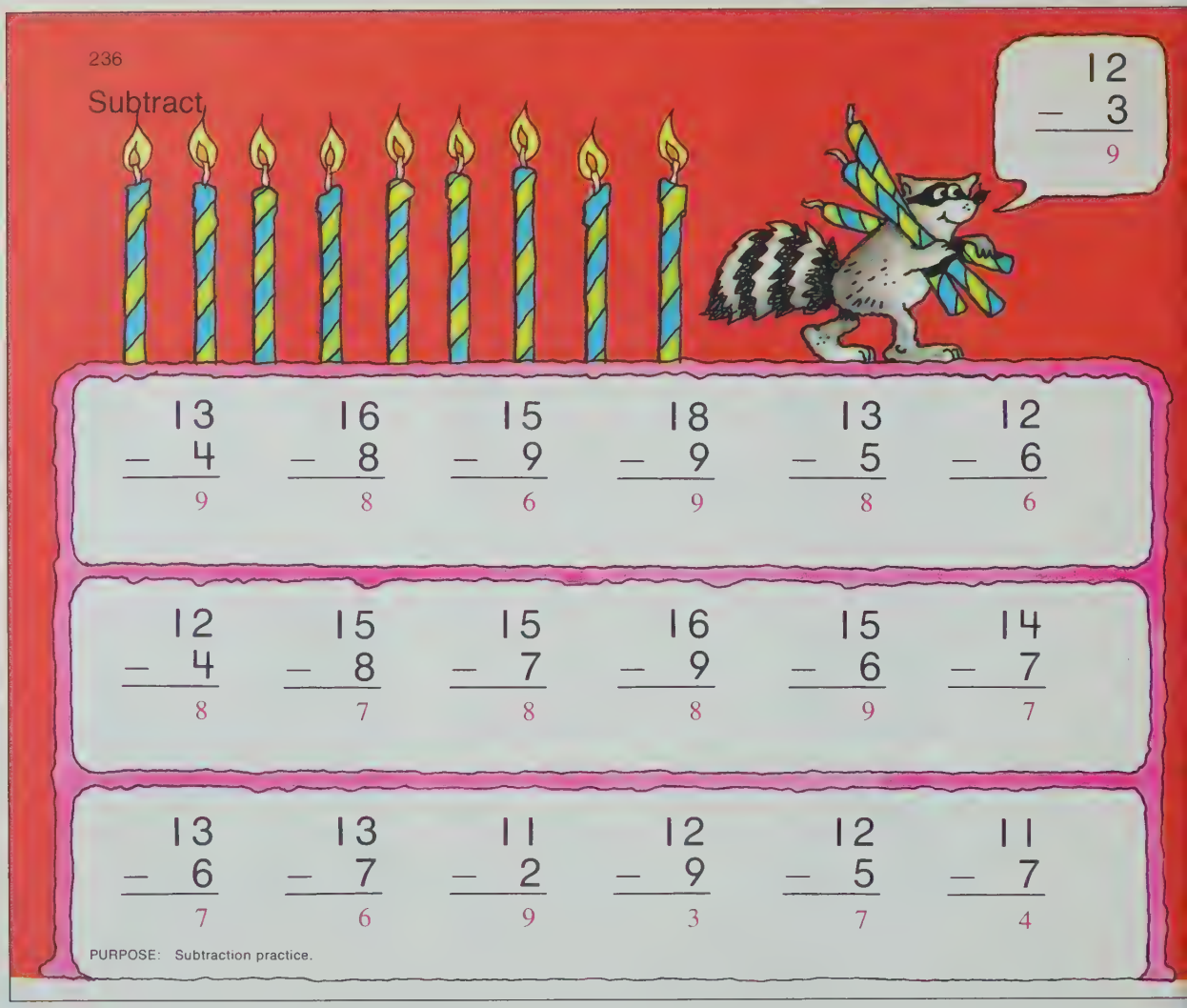
Have the children use counters and ten-trays to rework the problems they missed.

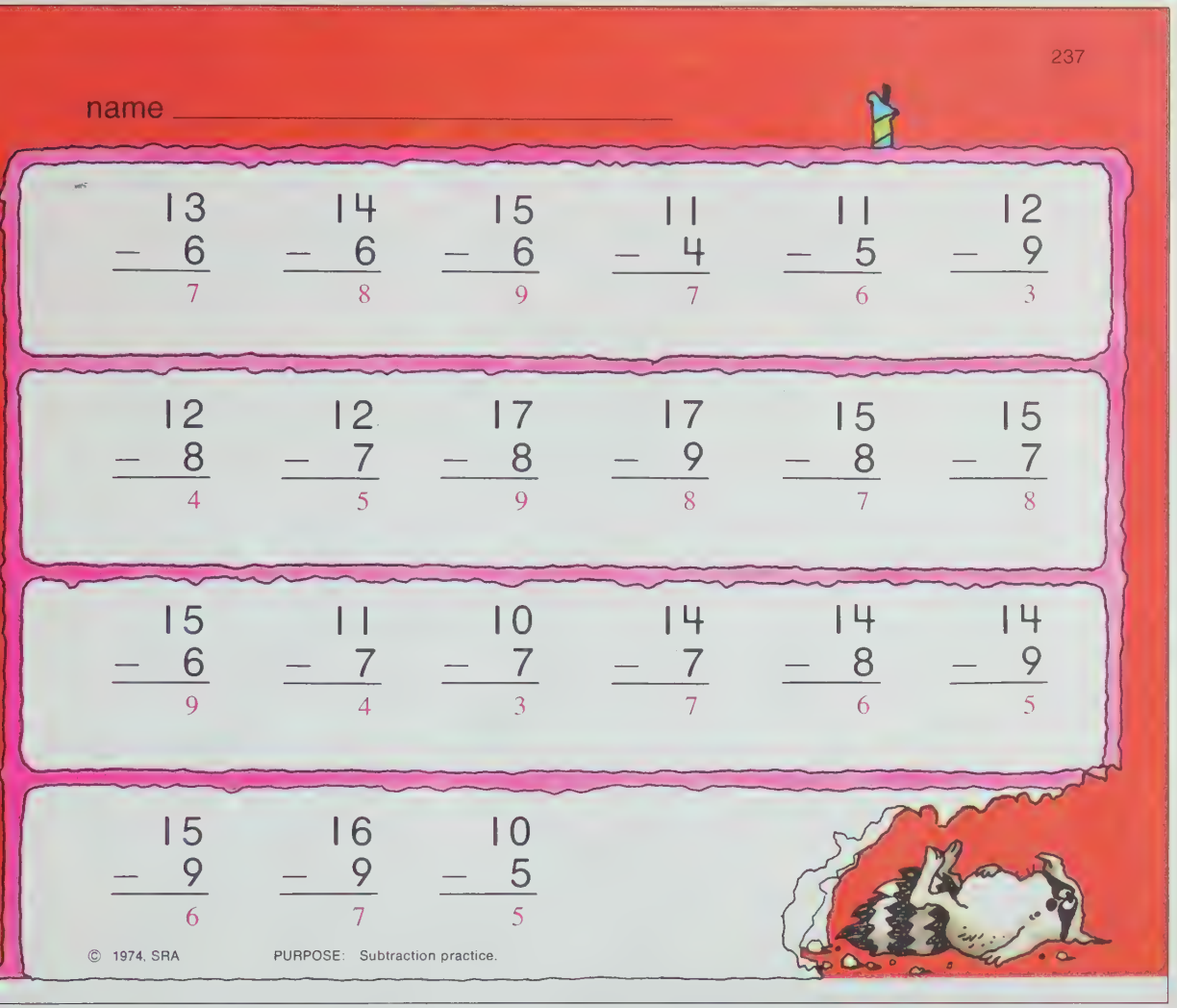
lesson Pages 236, 237, 238

goal Practice with subtraction facts

memo The focus is on understanding the operation of subtraction and on knowing how to find the number that remains, rather than on mastery of subtraction facts. How much practice is needed and which pages should be skipped are your decisions and will depend on your pupils' abilities and the school's curriculum. Continue the use of counters if necessary.

page 236 Discuss the action model at the top of the page. You may want to do the written work in two sessions. Have the boys do the first and second rows, girls the second and third rows. If more practice is needed, have them do the row they haven't done.





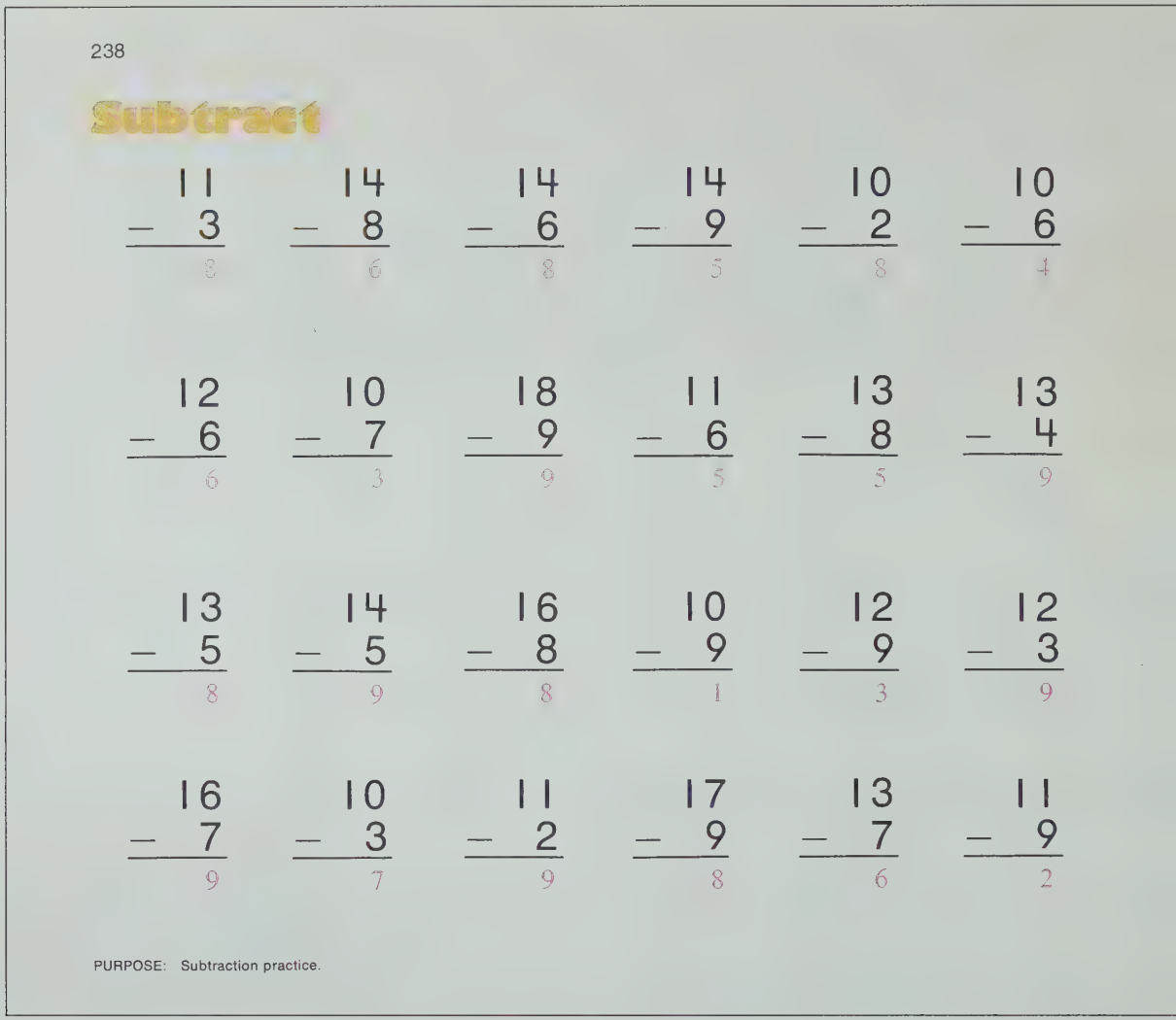
goal Practice with subtraction facts

page 237 Counters, fingers, and even tally marks are still in style. Adjust the assignment to the needs and abilities of your pupils. Have them use counters to correct any mistakes. Then make flash cards for further practice. Ask what is the easiest way to find the answer. Let them demonstrate. They may have a method that's better than any we know about!

goal Practice with subtraction facts

memo This is an extra-practice page. You may decide to assign all or only parts of the page. You may even want to skip it now and return to it after the checkout on page 241.

page 238 Create a little incentive by dividing the class into two teams. Children on each team work independently. The team with the least number of mistakes wins.



name _____

Does $11 - 3 = 8$?

Does $8 + 3 = 11$?
Does $11 - 8 = 3$?

$7 + 8 =$ 15

$15 - 8 =$ 7
$15 - 7 =$ 8

$8 + 5 =$ 13

$13 - 5 =$ 8
$13 - 8 =$ 5

Add

9	9	9	9	9	9
+ 4	+ 5	+ 6	+ 7	+ 8	+ 9
13	14	15	16	17	18

Subtract

18	17	16	15	14	13
− 9	− 9	− 9	− 9	− 9	− 9
9	8	7	6	5	4

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PURPOSE: Relating subtraction to addition.

things number strips 1 through 10 (activity, page 228)

Have the child lay a 9-strip on his desk. He is to find two strips that will be as long as the 9-strip.

Have the pupil write an addition sentence ($3 + 6 = 9$). Then have him remove the shorter strip and write a subtraction sentence. Put back that strip. Remove the other strip shorter than 9 and write another sentence.

lesson Page 239

goal Relating subtraction to addition

memo This page is a lot more difficult than it looks. Expect a few blank looks. If you keep a gamelike situation going, it won't be quite so painful.

warm-up Put a row of addition-fact sentences on the board. Leave lots of space between. Make an error on at least one: $5 + 8 = 14$, for example.

I have a feeling that I made a mistake. Are these problems all right? When they discover the error(s), ask what the answer should be and how they know.

I should have known that was a mistake, because I know that $13 - 5 = 8$. Write this on the board. *And I know that $13 - 8 = 5$.* Write this also. Then go to another addition sentence and ask what subtraction sentence is related to it. They will find one of them quickly. Tease them a little. *Are you sure? I was thinking of another subtraction sentence. Who knows what sentence I was thinking of?* Get them to find 2 related subtraction sentences for each of the remaining addition sentences.

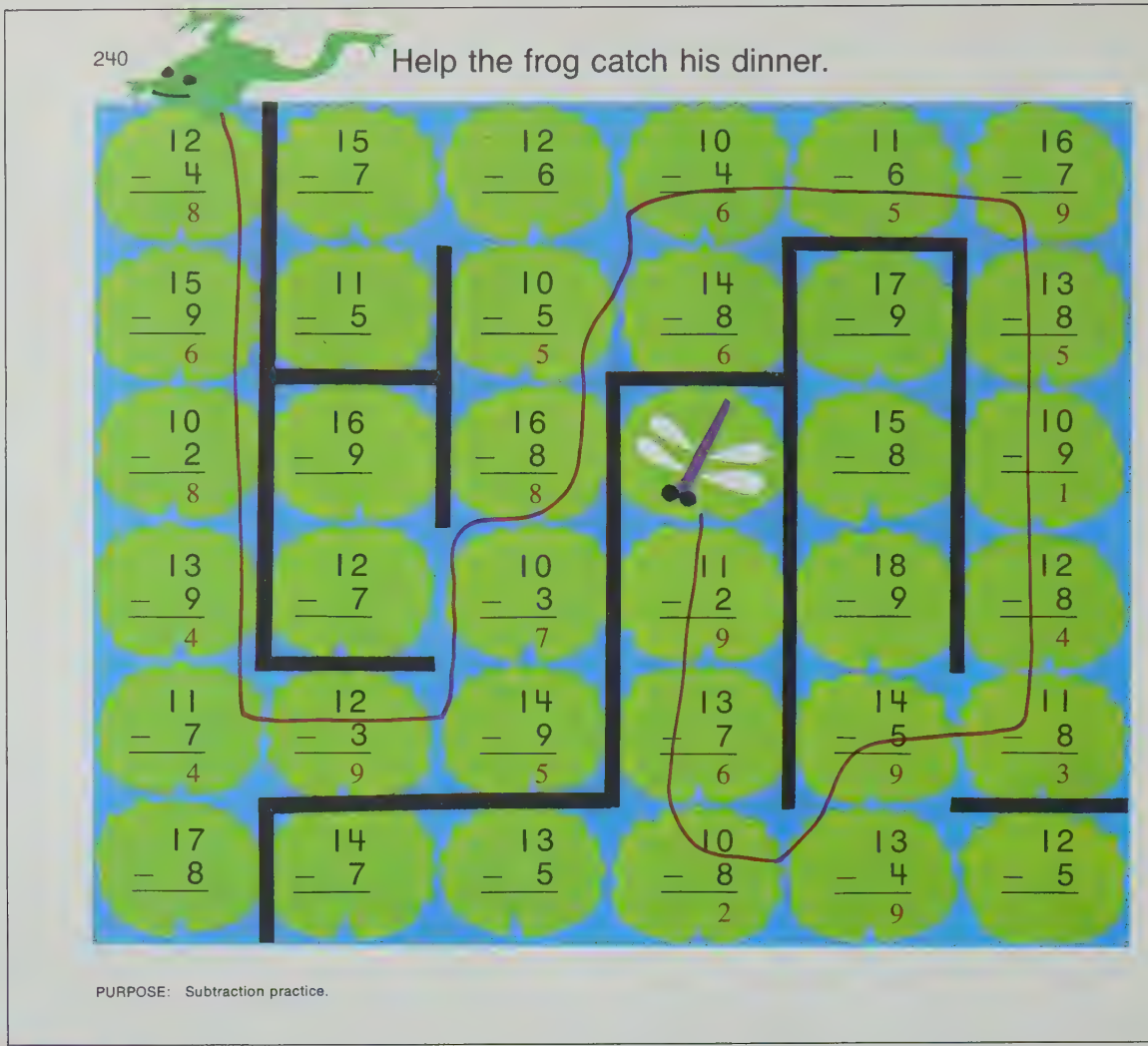
page 239 Do at least the first example together. On the lower part of the page, everyone looks for problems that go together. They might even use different colors to match them.

lesson Page 240

goal Practice with subtraction facts

page 240 *Who remembers how to do this kind of puzzle?*

Continue to ask questions until directions are clear. Remember to have them mark the path lightly first.



PURPOSE: Subtraction practice.

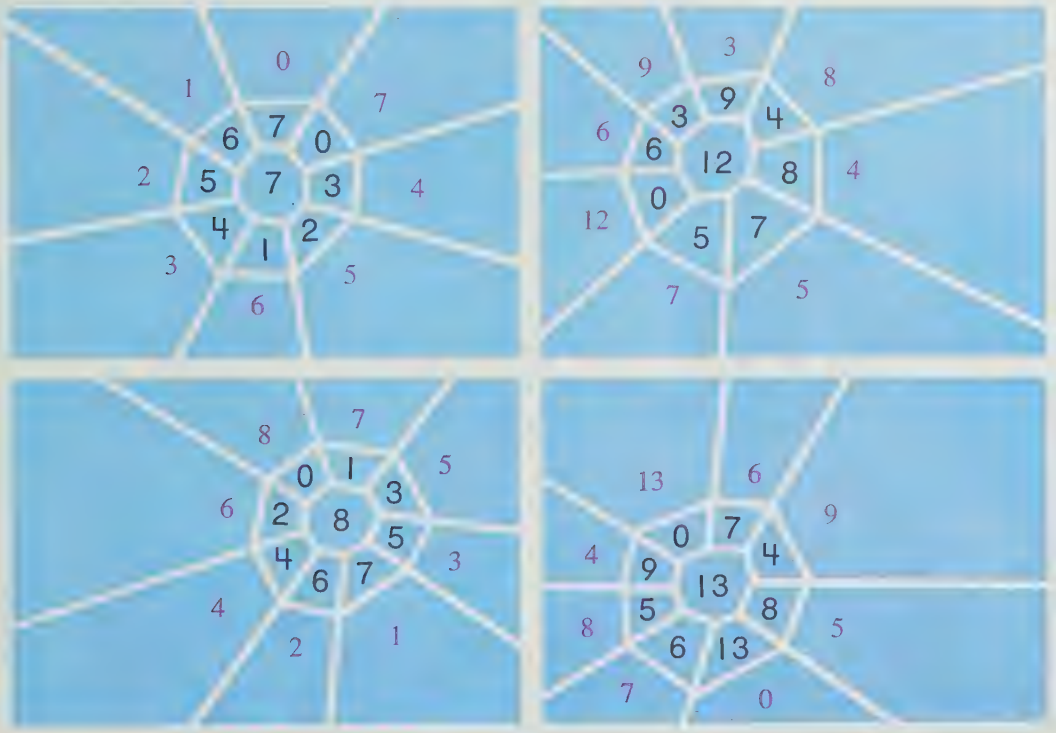
things for each pair of pupils: counters, wood cube numbered 6, 7, 7, 8, 9, 9

The first pupil chooses a number from 10 through 18. The second pupil rolls the cube and subtracts the number that lands faceup from the first pupil's number. Pupils alternate. Use counters to verify answers.

241

name _____

Subtract



PURPOSE: Checkout—subtraction.

STOP

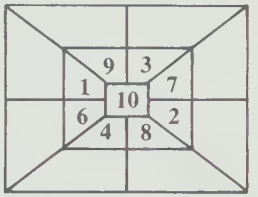
Here's how to use counting from a number and tally marks to help with subtraction.
5 − 3 = ___ Begin counting from 3 to 5.
11 Make a mark under the 3 for each number said—4, 5. Count the marks to find the answer.

See activity 3, page 245a.

lesson Pages 241, 242

goal **Checkout** – subtraction

warm-up Draw the following puzzle on the board.



This is a different-looking puzzle. A number is missing from each space. How do you think we can find it? (Add or subtract.) *Let's try subtracting. Where shall we begin?*

Complete the puzzle. Do only as many more as are necessary for the children to show you that they can operate easily with the format. Keep the problems simple.

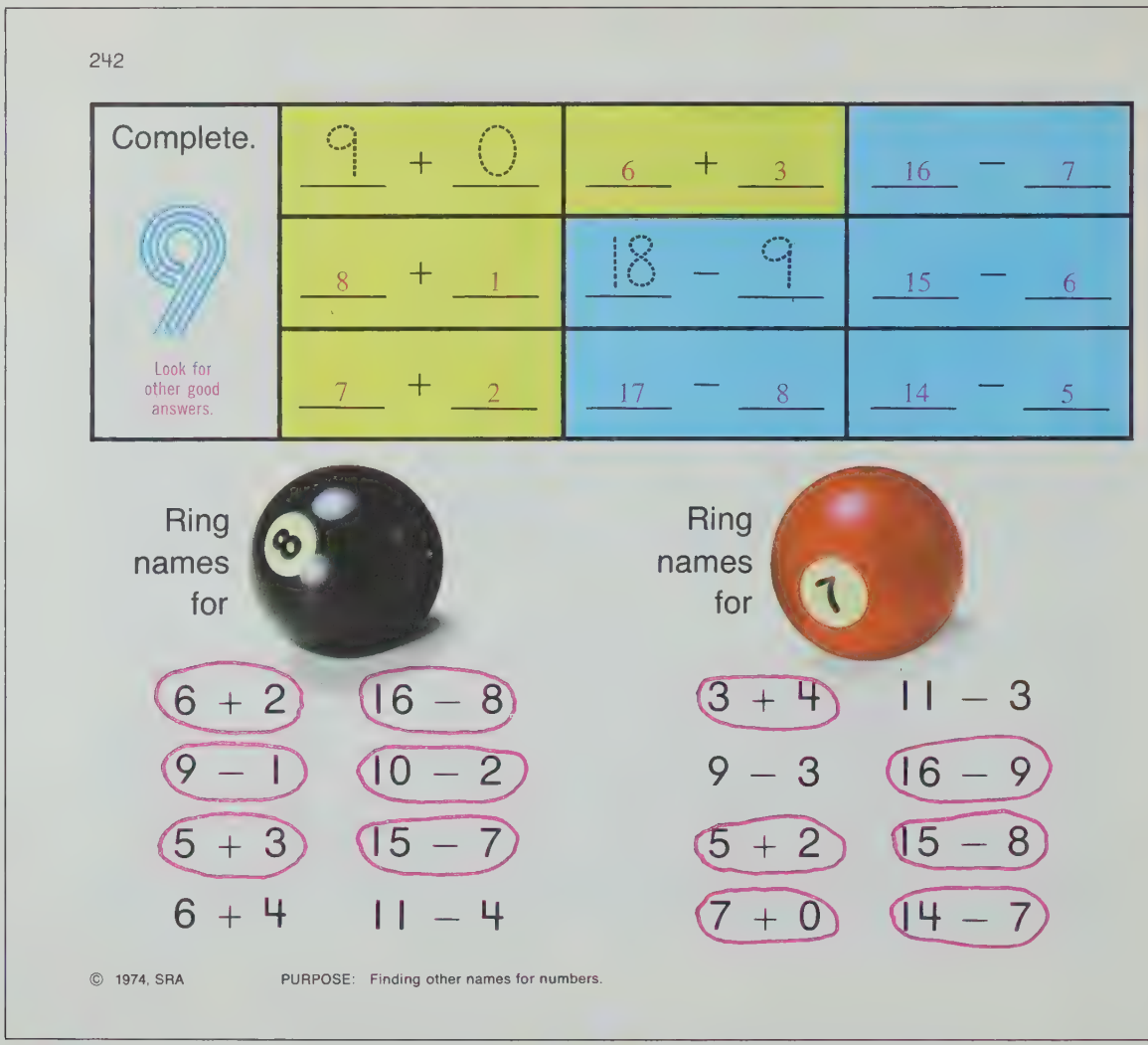
page 241 Spider-web puzzles! (This certainly doesn't look like a test, thank heaven!)

This is independent work. Counters are O.K. for those who need them. Use this page to identify those children who may need additional help.

goal Additional practice in finding other names for a number

memo This page may be used as independent work with the children who are succeeding, while you work with those who are having trouble subtracting. (See below and page 228.)

page 242 Check whether they remember the meaning of **other names** for a number. (If not, refer to page 184.) Discuss directions. Children work independently. Have them compare their completed work. They should figure out the right answer for themselves if two answers don't match.



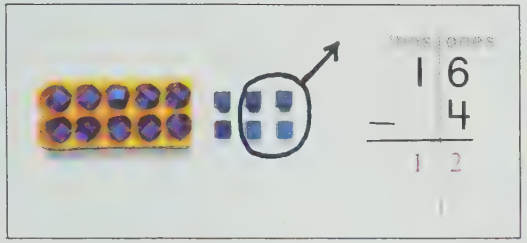
things number strips 1 through 10
(See activity, page 228 for how to make.)

Have the child lay a 9-strip on his desk. *Find two strips that fit together to make 9. Write the sentence. Find two other strips that will be as long. Can you find two others? Move the strips around and write more sentences.*

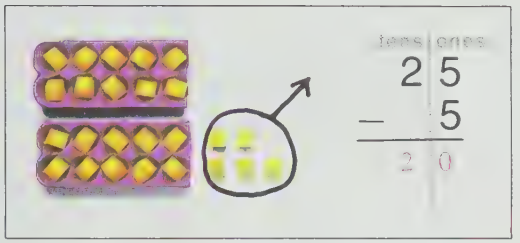
See activity 4, page 245a.

name _____

Subtract



tens	ones
1	6
−	4
1	2



tens	ones
2	5
−	5
2	0

Your turn to subtract.

tens	ones
1	6
−	2
1	4

tens	ones
2	4
−	3
2	1

tens	ones
4	7
−	1
4	6

tens	ones
6	4
−	4
6	0

tens	ones
5	8
−	6
5	2

tens	ones
3	6
−	1
3	5

tens	ones
7	3
−	1
7	2

tens	ones
8	4
−	2
8	2

tens	ones
2	9
−	1
2	8

tens	ones
3	7
−	7
3	0

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lesson Page 243

goal Exploring subtraction of a 1-digit number from a 2-digit number

things 3 full ten-trays
4 extra counters

warm-up Show 34 with trays and counters. Have this recorded on the board in the tens|ones format used on the pupil page.

Watch out! Don't let me trick you. Remove the 4 single counters. *Were 4 tens taken away? Then what was taken away? Who can come up to the board and write what happened?*

Once the subtraction problem is written, let the children figure out the answer. Check by counting the remaining counters. Repeat the procedure for 23 − 2.

page 243 Do the examples together. Do they remember what the loop and arrow indicate? Ask lots of questions. What was taken away? Focus on subtracting the ones first. Then look at the tens. Let those who can finish the page independently.

lesson Pages 244, 245

goal Exploring subtraction of a multiple of 10 from a 2-digit number

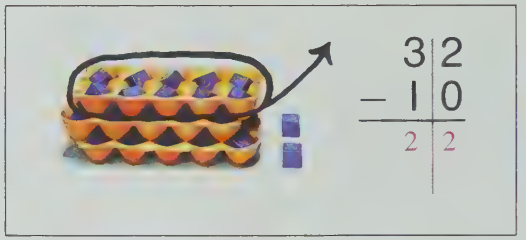
things 3 full ten-trays
5 extra counters

warm-up Show 35 with trays and counters. Stack the trays one on top of the other. Put this on the board.

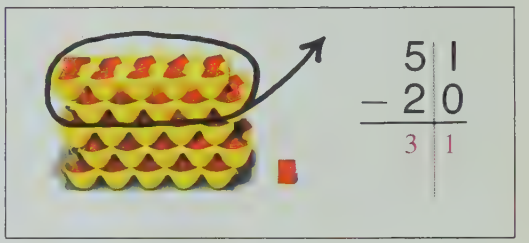
tens	ones
3	5

Careful! Don't let me fool you. Remove a ten-tray from the stack. *Were ones taken away? What was taken away? Who can write it on the board? Who knows the answer?* Check the answer by counting what remains. Continue with more examples until the children appear at ease.

page 244 Do the first example together. As you go from the picture to the computation model, you will still have to stress looking at the ones first. *Did we take away any ones? There were 2 ones. We subtracted 0 ones. How many ones remain? Write it. Now look at the tens. We had 3 tens. We subtracted 1 ten. How many remain? Write it. Look at your answer. Did you write 22? Good!* Continue in the same way.



$$\begin{array}{r} 32 \\ -\ 10 \\ \hline 22 \end{array}$$



$$\begin{array}{r} 51 \\ -\ 20 \\ \hline 31 \end{array}$$

Your turn to subtract.

$$\begin{array}{r} 43 \\ -\ 30 \\ \hline 13 \end{array} \qquad \begin{array}{r} 62 \\ -\ 40 \\ \hline 22 \end{array} \qquad \begin{array}{r} 94 \\ -\ 70 \\ \hline 24 \end{array} \qquad \begin{array}{r} 51 \\ -\ 50 \\ \hline 1 \end{array} \qquad \begin{array}{r} 85 \\ -\ 30 \\ \hline 55 \end{array}$$

$$\begin{array}{r} 76 \\ -\ 10 \\ \hline 66 \end{array} \qquad \begin{array}{r} 80 \\ -\ 20 \\ \hline 60 \end{array} \qquad \begin{array}{r} 95 \\ -\ 30 \\ \hline 65 \end{array} \qquad \begin{array}{r} 67 \\ -\ 50 \\ \hline 17 \end{array} \qquad \begin{array}{r} 90 \\ -\ 40 \\ \hline 50 \end{array}$$

PURPOSE: Subtraction practice.

name _____

He found 80.
She found 10.
How many were found? 90

She lost 10.
He lost 70.
How many were lost? 80

How many more were found than lost? 10

She made 60.
He made 30.
How many were made? 90

She sold 50.
He sold 30.
How many were sold? 80

How many more were made than sold? 10

30 came.
40 more came.
How many came? 70

20 went.
20 more went.
How many went? 40

How many more came than went? 30

© 1974, SRA PURPOSE: Addition practice; solving problems.

goal Solving addition word problems

warm-up Do a quick oral review of adding and subtracting two 2-digit multiples of 10.

page 245 Each set of 3 problems is interrelated. The pupils will soon discover that the correct answers to two of them are needed before there is a chance of getting the third one correct. Start by deciding what object the first problem is talking about. Did he find 80 pennies? 80 buttons? 80 bugs? Now get the answer. Do the next problem. Decide what object was lost. And finally the pupils may be delighted to discover that the numbers they wrote are the numbers they use to solve the last problem in the set.

It is up to you to decide if independent readers can work on their own or if it is best to keep this a group problem-solving session.

RESOURCES

another form of evaluation

for checkout—page 241

Divide a sheet of lined paper into four columns. Put one of the numerals 6, 9, 7, 4 at the top of each column. The pupil gets a point for every different name he can find for each of these numbers. (Addition or subtraction is O.K.) If he gets 25 points, he surely deserves a prize. How about letting him be math teacher for part of tomorrow's class. Let him pick an activity he would most like the class to do. You will have to help him organize.

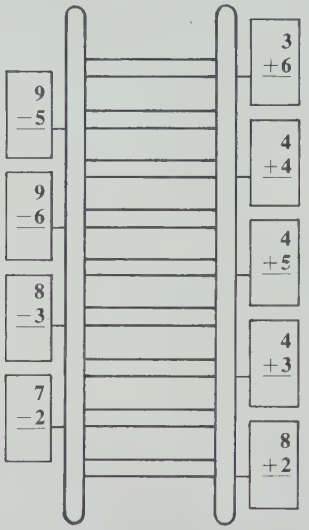
activities

1. things for each group: pile of counters, 1 counter per member, −, =, numeral cards

Group children by threes. Have each group display its minus card and its equals card, placed so that there is space for a numeral card between. (If the children have sentence holders, this is a good time to use them.) Place the pile of counters to one side.

The first player selects a numeral card and places it to the left of the minus card. The second picks the number to be subtracted and places it between the minus and equals cards. The third must find the card that tells the answer. If it's correct, he takes a counter and starts a new sentence. If it's wrong, he puts his counter in the pile, and the next player starts the new sentence. If there's a dispute, check the problem with counters. This technique will help should anyone form a sentence such as $4 - 6 = \underline{?}$ Let them discover what's wrong.

2. Show a ladder on a bulletin board. Next to each step, pin a flash card for a fact that needs more practice. The answers must be named going up and coming back down. Change the facts as needed.



3. things for each group: game board, subtraction flash cards

Use heavy paper or plastic to make the game board. Shuffle the flash cards and place them in a stack, facedown. Pupils take turns drawing a card and placing it in the answer square. The game continues until all cards have been used.

1	2	3
4	5	6
7	8	9

4. Subtraction tick-tack-toe: Prepare a spirit master with 4 to 6 game boards. The pupils work in pairs. Three correct problems in a row, column, or diagonal win the game.

10 − 1	13 − 7	10 − 3	10 − 3	10 − 9	10 − 2
11 − 2	16 − 8	12 − 9	10 − 8	10 − 1	10 − 5
14 − 5	10 − 6	13 − 5	10 − 7	10 − 4	10 − 6

additional learning aids

concept—chapter objectives 1 and 3

SRA products

Inquisitive Games: Exploring Number and Space, SRA (1967)
Buy and Sell Games I, II
Theater Tickets Games I, II

other learning aids—(described on page 256g)—Unifix (cubes)

operation—chapter objectives 2, 4, and 5

SRA products

Computapes, SRA (1972)
Module 1, Lessons: AS 15, 16, 17
Skill through Patterns, level 1, SRA (1974)
Spirit masters: 39, 40, 41, 42, 45, 46, 47

other learning aids—1 Win (sets 1 and 2), Mathfacts Games (addition, subtraction—levels 2 and 4), Mini Veri-Tech, Orbiting the Earth (addition, subtraction), Quizmo (add-subtract)

name _____ date _____

Computation Skill Performance for end of level 1

Addition facts skills

9	7	8	5	6	9	8	9	6	9	7	3
+1	+2	+4	+5	+4	+3	+2	+4	+3	+5	+4	+8

8	6	9	6	8	9	7	9	8	8	7	6
+5	+6	+9	+7	+8	+7	+5	+6	+7	+9	+7	+8

Addition mastery skills

26	37	38	54	36	51	39	42
+12	+21	+41	+20	+31	+40	+50	+35

59	43	22	30	45	27	21	81
+10	+56	+73	+18	+43	+50	+68	+17

Subtraction facts

5	8	9	7	6	1	6	5	8	8	9	5
−4	−5	−7	−6	−3	−1	−0	−5	−7	−4	−6	−3

7	9	8	7	9	9	8	7	6	9	7	6
−2	−4	−6	−3	−8	−5	−3	−5	−4	−1	−4	−2

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13 REVIEW

before this chapter the pupil has—

1. Identified the object that is first, second, third, next, last in an ordered set
2. Practiced addition facts with sums through 18
3. Practiced subtracting from numbers less than 10
4. Found addition and subtraction names for a number
5. Ordered the numbers 0 through 100

in chapter 13 the pupil is—

1. Identifying the positions first through tenth
2. Finding addition and subtraction names for a number
3. Practicing naming numbers that come before, after, between; that are less than or greater than
4. Checking out skills practiced throughout the book

Go to Level 2.

This chapter is mostly a review of the entire level. There is some new work with ordinal names, but the rest of the pages will let the pupils show off how much they have learned and how smart they are.

Both the children and YOU deserve congratulations.

You have done a good job.

words

The only new concept-development words are the ordinal names for numbers. They are introduced in order and they are all on the pupil pages.

first, second, third, fourth, fifth,
sixth, seventh, eighth, ninth, tenth

things

a word card for each ordinal name

lesson Pages 246, 247

goal Introduction to the ordinals, first through fourth

things word cards: first through fourth and last

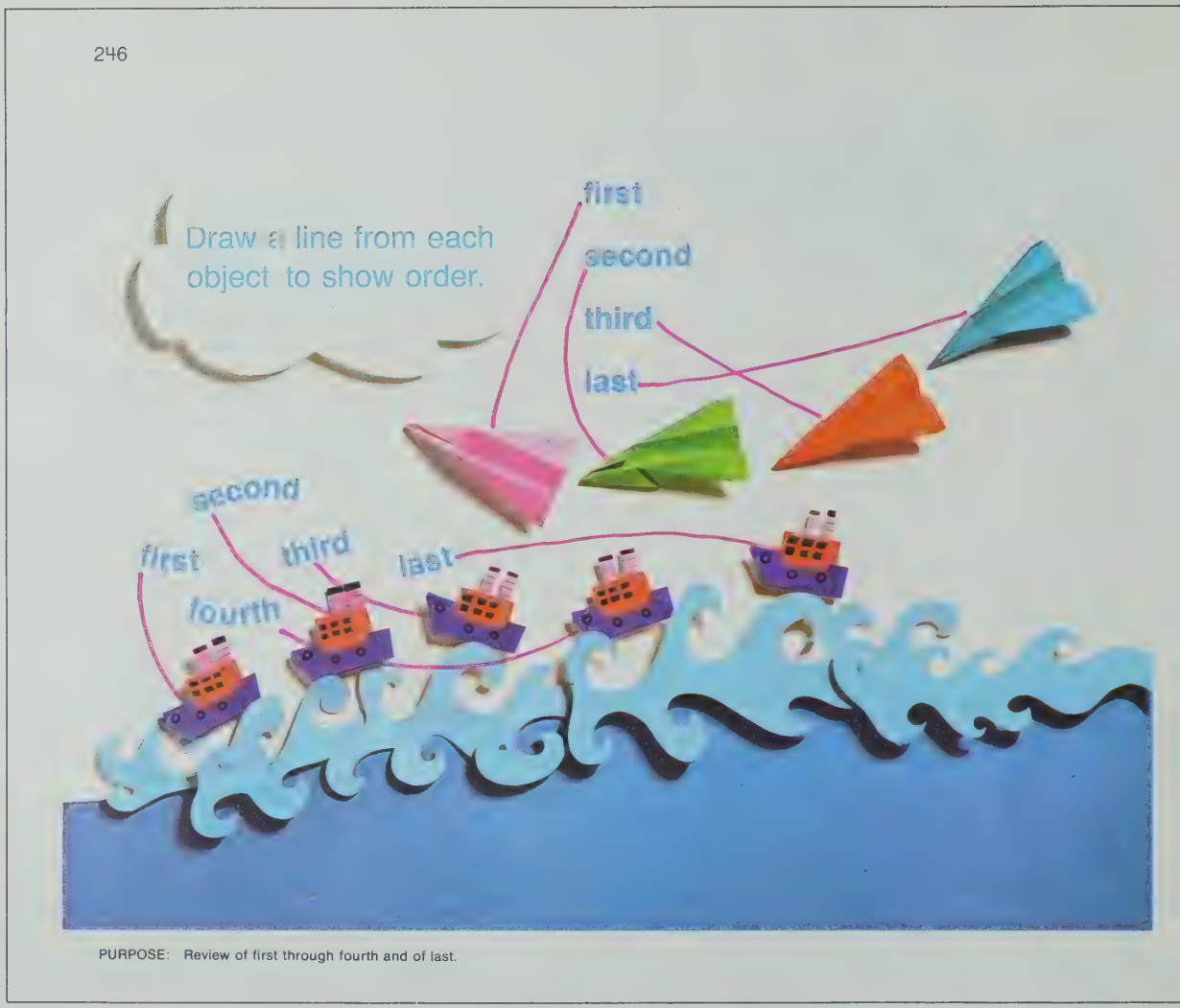
warm-up Display the cards for FIRST, SECOND, THIRD, and last in mixed order on the chalk ledge. Read the cards together.

Are the cards in order? How can we put them in order?

When the cards are in order, read them together. Pass out the cards to 4 pupils. Have them line up in order. Practice reading again.

Choose 5 children to stand in a line facing the door. Pass out the cards to different children but this time include the card for FOURTH. Have these children match the appropriate card to each child in line. Continue until the words are easily read.

page 246 Read the direction sentence. Ask what it means. When directions are clear, they're on their own.



name _____

© 1974, SRA PURPOSE: Introduction to fifth through tenth.

things ordinal-word cards—first through tenth

Call a child's name and show a card to tell him where to stand in line for recess. Or let 10 children each choose a card to tell them in what position to stand in line. Your class has more than 10 pupils? Collect the cards and begin a second line.

goal Practice with the ordinals first through fourth; introduction to fifth through tenth

things word cards: first through tenth

warm-up Fan the word cards in your hand so that the words can't be seen. Ask someone to pick a card. That person picks someone else to read the word. The picker keeps the card and holds it as he stands in front of the group. The reader gets to pick the next card and, in turn, picks someone else to read that word. When all the cards have been read, there should be 10 people up front holding word cards.

If the children know the meaning of the words, the people at their seats will be very anxious to get the group of unordered cards (and people) in order. If nothing happens, do some gentle teasing. *Who's first?* You will probably get 2 answers—the name of the person holding that card **and** the person who is first in line. Get the words and people in order.

Have the row face right. *Is first still first?* If not, get the correct order. Have the row face left. *Is first still first?* Now there is another job of reordering.

page 247 This is a do-together page. Discuss the animals using these types of questions. *Which is the third animal? the eighth? In what position is the horse? the monkey? the cat? What color is the fourth animal?*

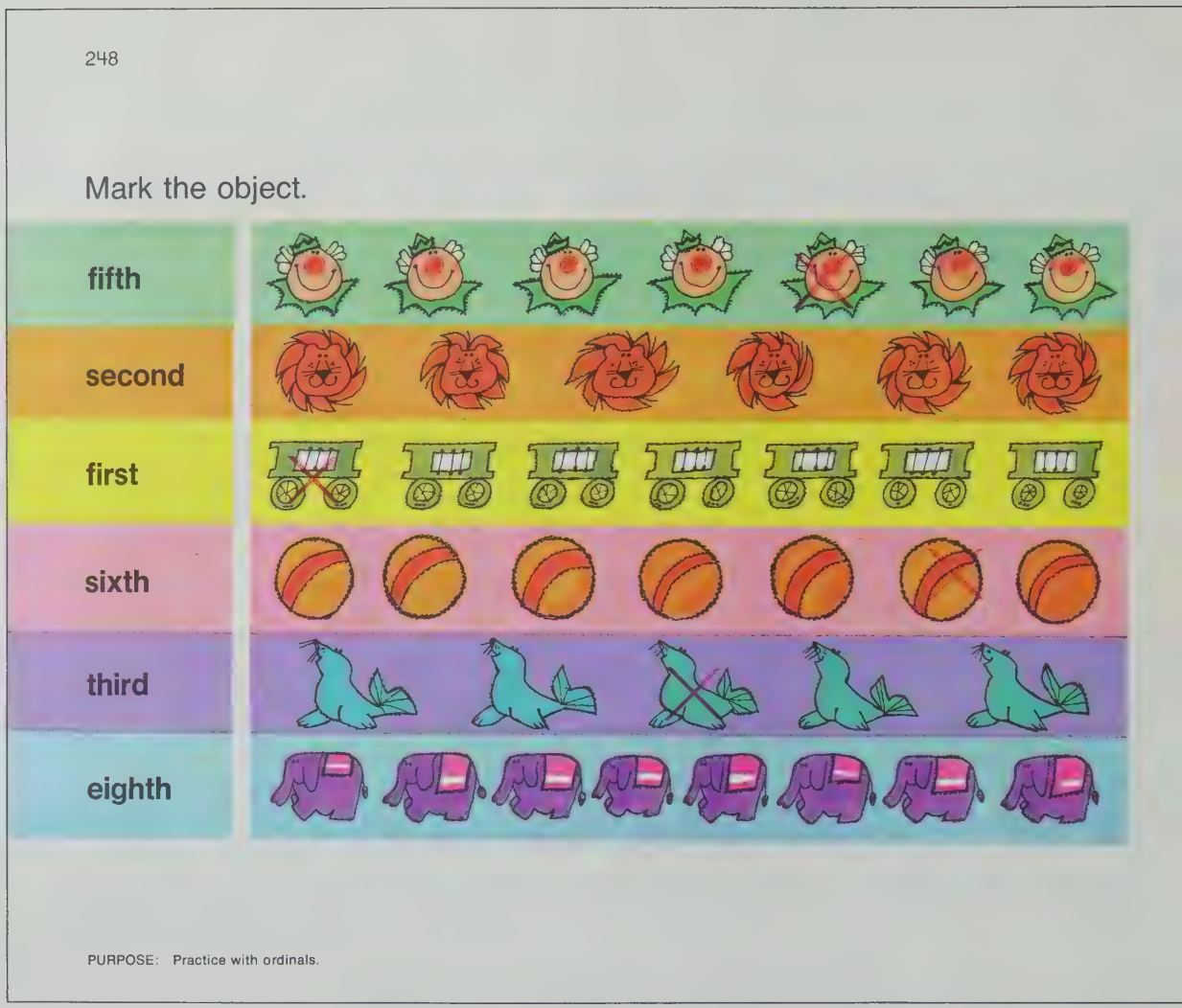
lesson Pages 248, 249, 250

goal Practice with ordinal numbers

page 248 Read the direction line. Examine the first row. Have the children place a finger on the first object and say the ordinal names up to the object that they are to mark.

When directions are clear, children work independently. It's your choice how they mark the object.

Go back to the first row. Ask which clown is last. (The **seventh** one is last.) Repeat the questioning for each row.



name _____

Mark the object.

© 1974, SRA PURPOSE: Practice with ordinals.

goal Practice with ordinal numbers

things 10 different classroom objects
ordinal-word cards

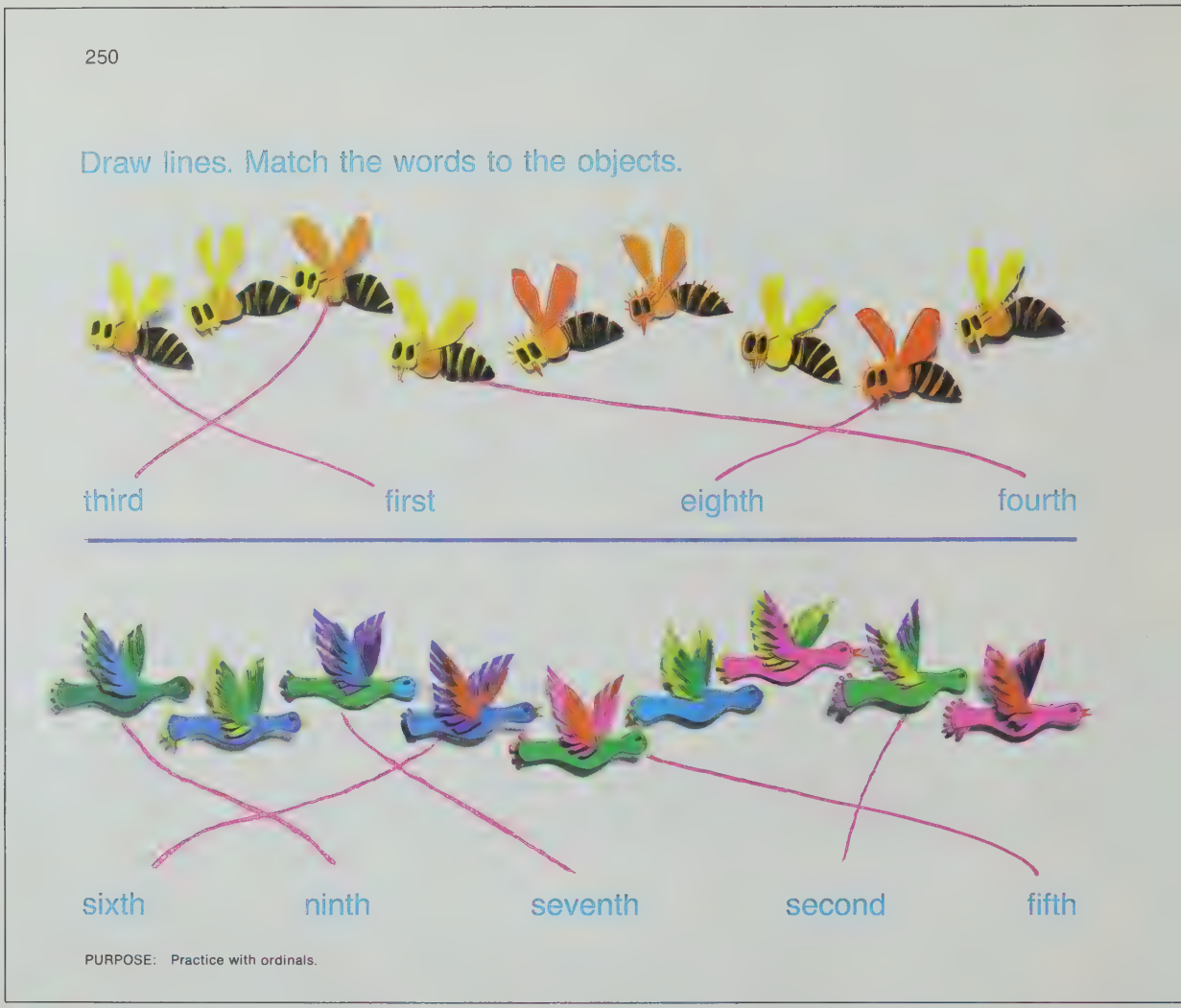
warm-up Have 10 children come to the front of the room and line up facing the door. Give each child a different object to hold. Ask what the fourth child is holding. Try a few more questions. Pass out the word cards to 10 others at their seats. These children should give their card to the appropriate child in line. Have the ninth person collect the cards and take his seat. Have the third person put his object on the table, take his seat, and so on, until everything is put away and each child is back where he belongs.

page 249 Discuss the direction of movement for each row. Then the children are to mark the object independently.

Why not lay a little groundwork for odd and even numbers while practicing the ordinals? Extend the Warm-up. Focus on the fifth person in line. Is it the same person when the line faces the opposite direction? Have the fifth child sit down. Now is the fifth child the same, no matter which way the line is facing? Strange! Just wonder with them but don't try to explain. The fifth child again sits down and the routine is repeated. Continue until there are only 6 children in line.

goal Practice with ordinal numbers

page 250 Read directions. Discuss the direction of flight. Everyone is on his own!



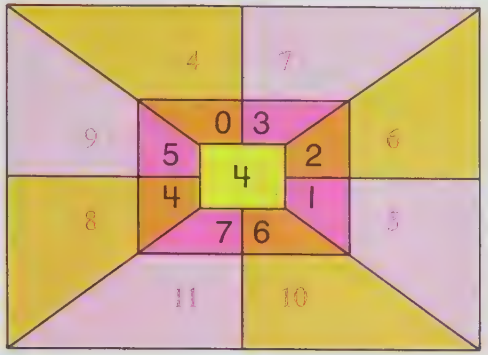
things for each pupil: pegboard, colored pegs

Number the rows of the pegboard, using a strip of masking tape placed along the left edge. Begin with 1.

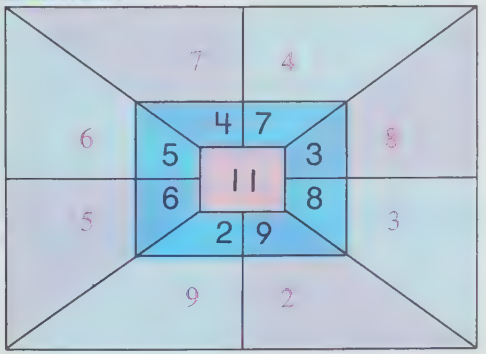
Find row 3. Put a peg in the first hole and in the last hole. Find the seventh row. Put pegs in ***most*** *of the holes. Find row 6. Put a peg in the third, sixth, and ninth holes.*

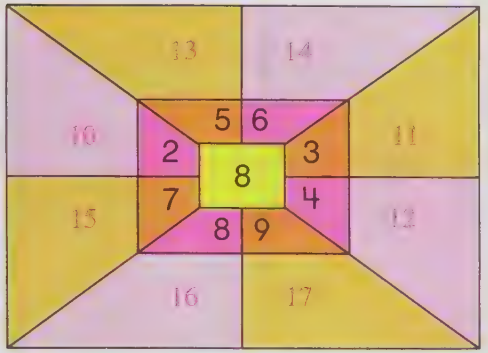
name _____

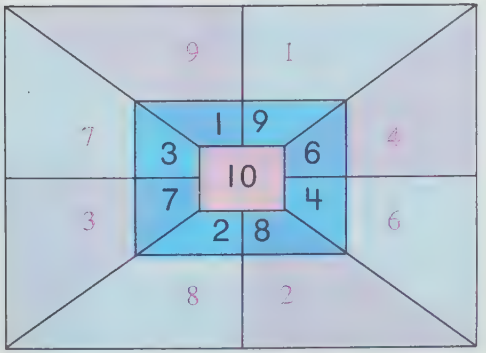
Add



Subtract







© 1974, SRA PURPOSE: Progress check—addition and subtraction facts.

things index cards

Time to make a flash card for each error and practice some more.

lesson Page 251

goal **Progress check**—addition and subtraction facts

memo You decide. Is a review of addition and subtraction facts necessary for some or all of your pupils before this progress check? Use any type of practice that is popular with the children.

things for each pair of pupils:
3 wood cubes numbered 0 through 5, 6 through 11, 12 through 17
counters
+, −, = cards

page 251 *Who knows how to do these puzzles? Do you add in each puzzle? Be very careful. Do your best.*

Have pupils use manipulatives to rework the ones they miss. They may also need to use flash cards for additional practice.

Fun for everyone! Pupils work in pairs. The first pupil rolls 3 wood cubes and challenges the other to make a true sentence using the three numbers that land faceup and two of the cards. This may not be possible. The pupil takes 1 counter for each true sentence.

lesson Page 252

goal Practice in finding other names for a number

warm-up Review finding other names for a number by writing a large 6 on the chalkboard.

Who knows an addition name for 6? Write it on the board. Is there another addition name for 6? Great! Come and write it. Don't let me fool you. Do you know a subtraction name for 6?
Have these written on the board.

page 252 Read the directions at the top of the page. *What does that mean?*

Be certain they understand that **only one** number goes inside the circle. Make extra paper available if anyone needs it.

Do all three boxes name the same number?
If they do, put the number inside the circle.

15 − 9	16 − 9	9 + 6
3 + 3	6 + 1	7 + 8
12 − 6	15 − 7	10 + 5
6		15

10 + 10	17 − 9	18 − 8
30 − 10	5 + 3	4 + 6
19 + 1	8 − 0	20 − 10
20	8	10

PURPOSE: Finding other names for numbers.

name _____

What comes before and after?			
3	4	5	6
9	10	11	12
19	20	21	22
50	51	52	53
64	65	66	67
77	78	79	80

What comes between?			
84	85	86	87
39	40	41	42
58	59	60	61
79	80	81	82
21	22	23	24
97	98	99	100

Make an arrow point to the smaller number.

56 ← 79	63 → 59	38 ← 60	10 → 9
19 ← 20	35 → 20	100 → 10	1 ← 10
0 ← 1	45 → 35	62 ← 72	68 ← 98

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PURPOSE: Review of the order and size of numbers.

lesson Page 253

goal Review of the order and size relation of numbers

memo You know your pupils better than anyone. Is some review of the symbol or is practice necessary before they go to the page?

page 253 Discuss directions for all 3 parts. With the less able, you may want to proceed with one part at a time. The page is independent work.

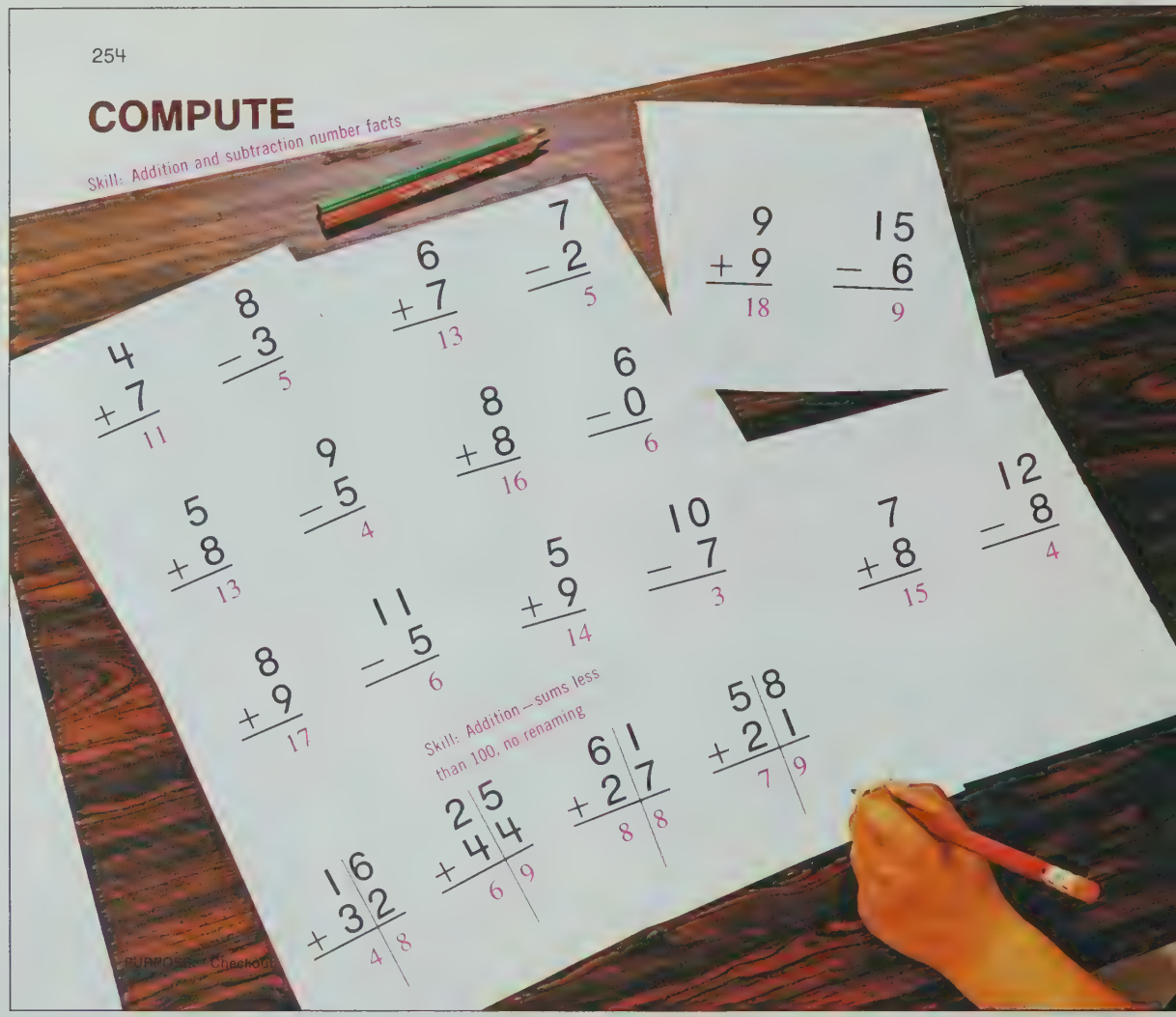
lesson Pages 254, 255, 256

goal **Checkout**—addition and subtraction facts; adding two 2-digit numbers

memo The last three pages are a checkout of the year's work. You may want to take time out for some review. Use the games and activities suggested throughout the program.

There's no need to mention testing. This is their chance to show off how much they know. You will want to take two or three sessions to complete the pages. It will be fun for you and the children to see how much progress was made!

page 254 Careful! Addition and subtraction are mixed. Give fair warning. The children work independently.



name _____

Skill: Writing number represented by sets of tens and ones

1. How many? 43

Skill: Comparing numbers less than 100

2. Name a number more than 89.

Any number greater than 89

3. Name a number less than 13.

Any number less than 13

4. Mark the sixth person.

Skill: Using ordinal numbers (first–tenth)

Skill: Renaming a number

5. Write the number five without using 5.

Example: 4 + 1

6. Write the number five again without using 5.

Example: 7 − 2

Skill: Identifying straight edges

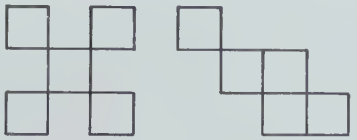
7. Draw a rectangle.

Look for straight edges.

© 1974, SRA PURPOSE: Checkout.

things lots of 1-inch squares (construction paper), paste, sheet of paper

Challenge: Use sets of 5 squares. *How many patterns can you make? Make sure the squares touch. Paste your pattern on paper.* Have fun!



goal **Checkout** – place value; order of numbers; other names for a number; geometric shapes

page 255 Do not let words stand in the way. Make sure that the children understand all directions.

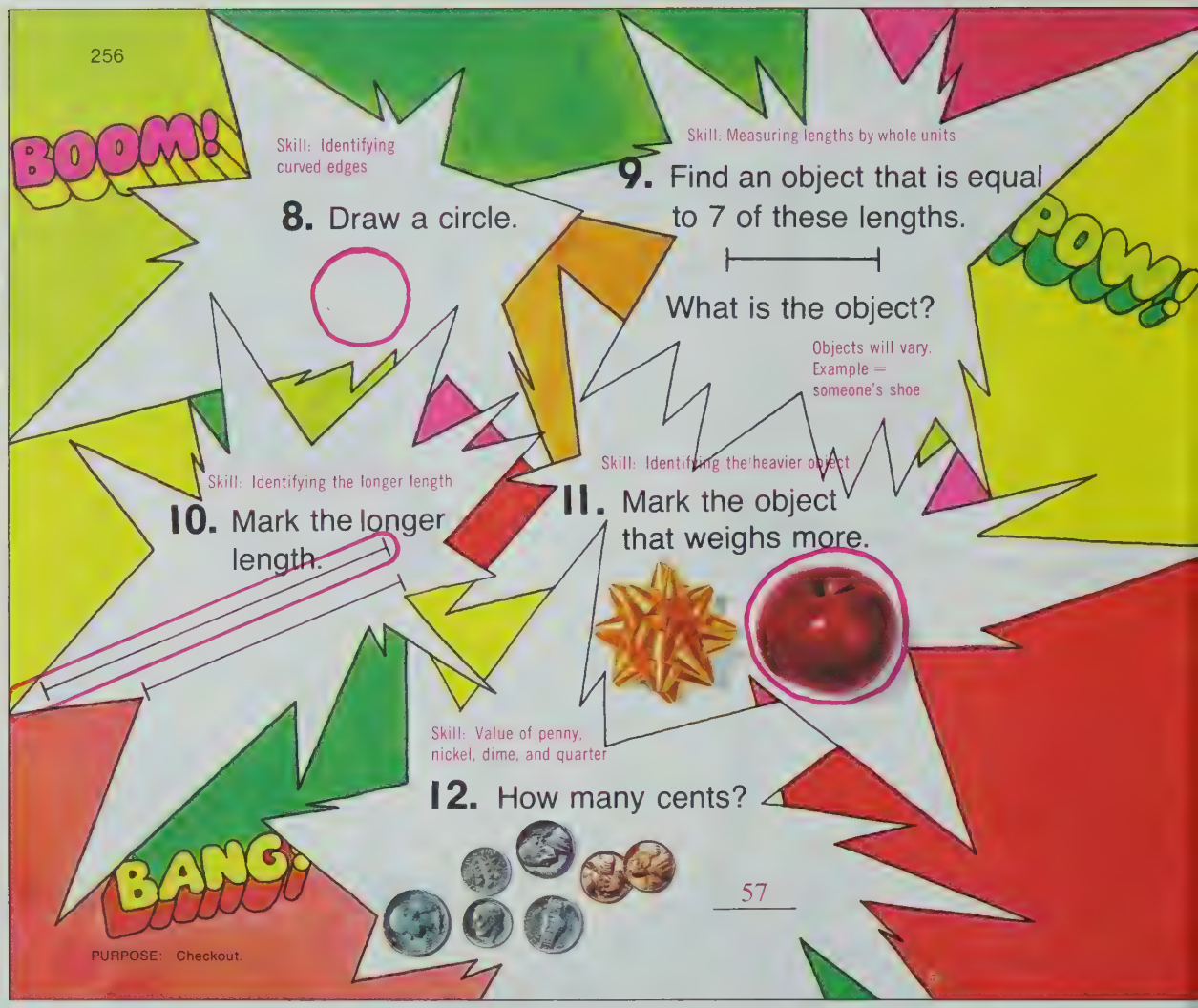
goal **Checkout** – geometric shapes; measuring and comparing lengths; comparing weights; counting money

page 256 YIPPEE!

We've reached the end of this book. Wonder what will come next.

Please help with the reading and clarification of the directions.

After all this hard work it's time for some fun! You may want to share with the children the poem on page 256d.


256
BOOM!
Skill: Identifying curved edges
8. Draw a circle.
Skill: Measuring lengths by whole units
9. Find an object that is equal to 7 of these lengths.
What is the object?
Objects will vary. Example = someone's shoe
POW!
Skill: Identifying the longer length
10. Mark the longer length.
Skill: Identifying the heavier object
11. Mark the object that weighs more.
Skill: Value of penny, nickel, dime, and quarter
12. How many cents?
57
BANG!
PURPOSE: Checkout.

RESOURCES

activities

The summer is long. Parents often want to know what they can do to help their youngsters maintain the skills they have learned. The games that have been suggested in this guide using old decks of playing cards or cubes will certainly help. And consider sending home a new game—the Match Sets Game. You'll find the game board, rules, and game pieces on pages 256b and 256c. You are free to duplicate these pages. You may want to adapt the game for classroom use by substituting numerals for the dots in some of the sections so that the numerals can be matched to the correct number of dots.

But don't forget about commercial games distributed by various companies. Here is a list of but a few.

Creative Publications, Palo Alto, California:
- 'Rithmetic Teacher®
- Keyboard Counter
- Pattern Blocks and Mirrors
- Tic-Tac-Toe
- Four-in-One Puzzle™

Milton Bradley, Springfield, Massachusetts:
- Mathfacts Games™—levels 1 through 4
- Count Your Change
- Link Numbers
- Quizmo®—Add-Subtract

Idea School Supply Company, Oak Lawn, Illinois:
- Sum Fun!®
- Design Blocks and Patterns
- Kaleidoscope Puzzles

And by all means, don't overlook math in the world around you. Which package costs more? Which costs less? If you like to garden, why not record the growth of a plant? Keep track of how much water is needed. How many times does the grass need to be cut? Embroidering patterns on burlap is a great activity. The list could go on and on. We're sure you get the idea and can think of even more interesting and worthwhile possibilities.

additional learning aids

concept — chapter objectives 1

SRA products

Inquisitive Games: Exploring Number and Space, SRA (1967)
Colored-Stick Activities: 6, 7
Mathematics Involvement Program, SRA (1971)
Cards: 141, 62
Skill through Patterns, level 1, SRA (1974)
Spirit master: 43

notation — chapter objectives 1, 2

SRA products

Skill through Patterns, level 1, SRA (1974)
Spirit master: 44

operation — chapter objectives 4

SRA products

Skill through Patterns, level 1, SRA (1974)
Spirit masters: 45, 46, 47, 48

letter to parents

Dear Parents,

I want to sincerely thank you for your interest and cooperation this year. It is rewarding to look back over the year and at the same time do some planning for the future. Your child will not be able to tell you all the things he has learned this year, but he can share his progress record with you.

(Use pupil progress record duplicated from the Teacher's Guide, page 256e)

I hope that over the summer months your child will be able to use these skills, because the next level of mathematics will be built on this learning.

Groceries will have to be purchased, there will be games to play, the clock will tell what time to be home, buildings will be built in your community, and there may be a family vacation, too. All these activities are full of mathematics and opportunities for review.

It has been a good year. Thank you again.

These squares are the game board for the Match Sets Game—a game for two players.

Here are the rules for the game:	1 Six pieces are dealt face up to each player.	2 The first player places one piece somewhere on the game board.	3 The second player places a square so that the number of dots touching match.
4 It's the first player's turn again. He takes a square and places it so that the number of dots will match the side of any piece already on the game board.	5 Play continues.	6 If a piece is placed so that it touches two pieces, then the number of dots on both pieces must be matched. Here's where the fun begins.	7 Sometimes three sides must be matched. You need to be lucky now.
8 If a player does not have a matching piece, he passes. The other guy gets to play again.	9 The game ends when neither player can play. The winner then is the one with the fewest pieces left.	Fair warning. If an adult plays a youngster, the youngster generally wins. Big folks get involved with strategy, while little folks just play by the rules. This game is fun for all.	**Have fun!**

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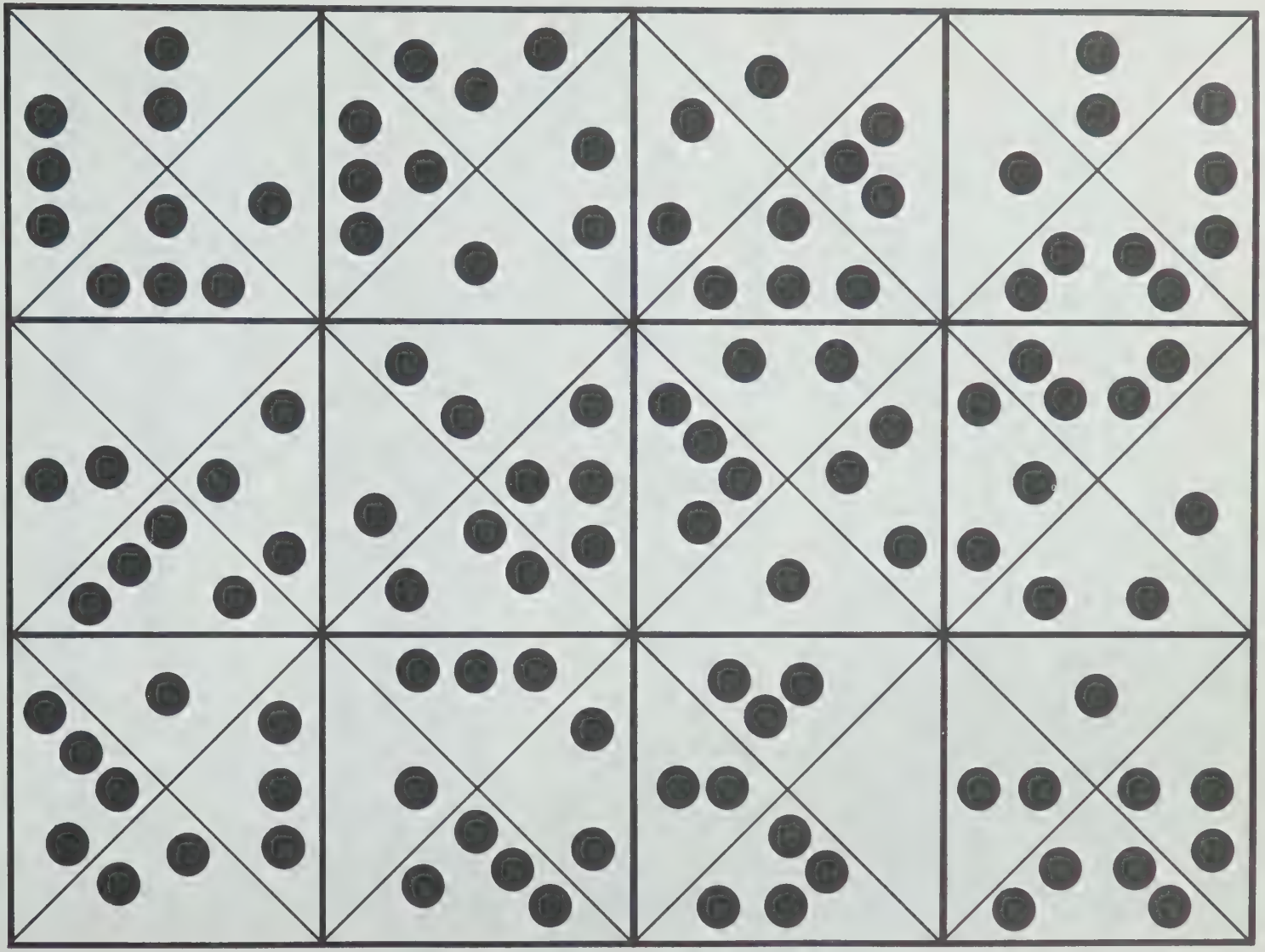
Cut out these squares. They are playing pieces for the Match Sets Game.



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We hope the book was fun.
We know you learned a lot.
Adding and subtracting —
All the answers that you got!

Don't forget the fractions.
That's really grownup stuff.
And all the work with shapes—
That wasn't very tough.

There were new words, signs,
and numerals.
You learned to write each one.
Ten-trays, the clock, money—
Think of all the work you've done.

Now the book is finished.
It's time to take a rest.
Have a supergood vacation.
You deserve the very best!

The Authors

M. Vere DeVault Helen Frehmeyer

Herbert J. Greenberg Stanley J. Bezuszka

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my name_____

my teacher's name_____

	I can do it everytime.	I will be able to do it soon.
I can follow directions.	_____	_____
I can work with others.	_____	_____
I can work alone.	_____	_____
I can get a job done.	_____	_____
I can find things myself.	_____	_____
I can put things away too.	_____	_____
I know how to count from 0 to 100.	_____	_____
I know how to write the numbers from 0 to 100.	_____	_____
I know which number is more than another number.	_____	_____
I can show you how to add 7 things to 9 things.	_____	_____
I can show you how to subtract 8 things from 14 things.	_____	_____
I know all the answers to problems like these: 3 5 2 5 3 9 +4 +2 +0 +5 +7 +2 6 5 8 9 9 7 +5 +8 +7 +9 +8 +6	_____	_____
I know all the answers to problems like these: 43 58 70 46 +56 +31 +29 +12	_____	_____
I can find things shaped like a box.	_____	_____
I can find things shaped like a can.	_____	_____
I can find things shaped like a ball.	_____	_____
I can show you flat or curved surfaces.	_____	_____
I can tell you which of two strips of paper is longer or shorter.	_____	_____
I can take a measuring piece of cardboard and tell you how many long my shoe is or how many long my desk is.	_____	_____
I can pick up 2 different things and tell you which is heavier.	_____	_____
I can pick out a penny, a nickel, a dime, or a quarter and tell you how much each is worth.	_____	_____
I can tell you how much money I have to have if I buy a hamburger for 45¢ and something to drink that costs 23¢.	_____	_____
I can tell you when the clock says 8 o'clock or 6 o'clock or 12 o'clock or 4 o'clock.	_____	_____
I can show you how to find the tenth person in a line of people.	_____	_____

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individual progress chart for _____
(pupil name)

recorded by _____—first-level teacher

evaluation of learning goals	date of 1st try	date of 2d try	comments
Knows the numbers 0–3 (p. 22)			
*Knows the numbers 0–6 (p. 36–37)			
Knows the order of numbers 0–6 (p. 49)			
Knows shape and size patterns (p. 49)			
*Knows shapes (p. 52)			
*Knows the numbers 7, 8, and 9 (p. 63)			
Knows sums less than 10 (p. 79)			
Knows sums through 10 (p. 93)			
Knows the addition facts (p. 114)			
Knows the addition facts (p. 116)			
*Knows the addition facts (p. 124)			
*Knows how to tell time to the hour (p. 133)			
*Knows about tens and ones (p. 151)			
*Knows length comparison (T.G., p. 153d)			
*Knows number of whole units in length of a given object (T.G., p. 153d)			
Knows which weighs more (T.G., p. 153d)			
Knows 1-digit subtraction facts (p. 175)			
Knows 1-digit subtraction facts (p. 177)			
*Knows 1-digit subtraction facts (p. 185)			
Knows penny, nickel, dime, and quarter (p. 205)			
*Knows addition of two 2-digit numbers with no renaming (p. 218)			
Knows how to write fractions $\frac{1}{2}, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{1}{8}, \frac{7}{8}$ (p. 225)			
*Knows the subtraction facts (page 241)			
*Knows addition and subtraction facts (p. 251)			

end of level checkout for mastery on pages 254–56

Knows the addition and subtraction facts			
Knows addition of two 2-digit numbers with no renaming			
Knows numeral for a number of tens and ones			
Knows comparison of two numbers less than 100			
Knows ordinal numbers first through tenth			
Knows shapes			
Knows number of whole units in length of object			
Knows which of two lengths is longer			
Knows which of two objects is heavier			
Knows value of penny, nickel, dime, and quarter			

*Checkout

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Other Learning Aids

whole-number concepts

Arithmetic Tube Ideal
Demonstrates sets of from 1 through 9 counters; addition and subtraction facts

Counting Blocks Ideal
Multicolored one-inch wood cubes used for counters

Counting Chips Creative Publications
Plastic disks of eight colors to use in counting and sorting activities and in work with place value and simple computation

Counting Rods Ideal
Wood rods of ten proportioned lengths and a tray useful for activities such as building a number-step pattern, developing equivalent lengths, and comparing lengths

Cuisenaire Rods Cuisenaire
Rods of ten colors and ten proportioned sizes to model patterns and number relationships

Hainstock Blocks Creative Publications
Ten blocks, one for each numeral 0 through 9 corresponding to the Cuisenaire colors, to illustrate all addition combinations having a 1-digit sum

Keyboard Counter Creative Publications
Two sets of ten flip-up keys to illustrate sentences in addition and subtraction and groupings

Lots-A-Links Creative Publications
Plastic links for grouping and counting activities

Match It Game Singer-SVE
A board game designed to provide practice in numeral recognition and to reinforce number sequence

Number Sorter Sigma Scientific
A pegboard with a given number of pegs for each number 1 through 5 for matching a set of squares with holes that correspond to the peg groups

100 Number Board Dick Blick
A marked grid board and 100 numbered plastic tablets for counting and ordering

Two-Place Number Board Ideal
Wood disks to show ones and grooved wood pillars to show the value of ten disks

Unifix (Cubes and Components)
Available from several sources, plastic interlocking cubes and component parts for number recognition, counting, numeration, and whole-number operations

whole-number notation

Beginners Number Milton Bradley
Poster Cards
Giant-size posters showing realistic and semiabstract objects, numerals, numeral words, and combinations of money

Magic Slates
Available from several sources, individual slates for numeral-writing practice; made reusable by simply pulling up the plastic sheet

Matchmates Sigma Scientific
Ten pairs of interlocking wood pieces that fit together when a set picture and a numeral are matched

Math Bingo Sigma Scientific
Game cards to practice recognition of the numerals 1 through 10 and geometric shapes and to develop vocabulary

Numberite (Deluxe) General Learning
Notched boards with flocked numerals and numeral words that fit together only when properly sequenced from 0 to 10 for a kinesthetic approach to numeral writing

Stepping Stones Instructo
Rubber mats, one-foot square, each with a numeral 1 through 20

whole-number operations

Abacus Board Creative Publications
Board with pegs for learning the concepts of addition and subtraction

I Win Scott, Foresman
Phrase cards to pair with answer cards for addition and subtraction practice
Set 1—sums to 12
Set 2—sums to 18

Make and Take Game Singer-SVE
A board game to provide practice with addition and subtraction facts (sums through 9)

Mathfacts Games Milton Bradley
Practice with the basic addition and subtraction number facts
Level 1—addition, sums less than 10
Level 2—subtraction, related to above
Level 3—addition, sums 10 through 18
Level 4—subtraction, related to above

Mini Veri-Tech ETA
A twelve-title minicomputer and problem books in game form to provide self-corrective practice with the basic facts

Orbiting the Earth Scott, Foresman
(addition and subtraction)
Players to toss numeral blocks and state basic facts correctly to move markers about on a playing field

Quizmo (add-subtract) Milton Bradley
A lotto-type game for practice with addition and subtraction facts

fraction concepts

Fraction Circles Ideal
A set of six circles with one frame, divided into fractional parts, for developing the concept of fractions

Fraction Squares Ideal
A set of six squares with one frame, divided into fractional parts, for developing the concept of fractions

Visual Fraction Apparatus Mind/Matter
Twenty ridged fractional parts that fit on top of each other to show equivalent fractions

geometry concepts

Alike Unalike Books (set 1) Mind/Matter
Four strip books that use geometric shapes in various sizes to develop likenesses and differences

Attribute Blocks
Available from several sources, geometric shapes of varying sizes, colors, and thicknesses for classifying likenesses and differences

Color & Shape Bingo Sigma Scientific
A color-and-shape-recognition game

Geoboard Activity Cards Creative Publications
(primary set)
Activity cards to help children explore and compare geometric shapes and designs, using a geoboard

Geoboard Classroom Kit Cuisenaire
Individual boards and activity cards to help children investigate geometric relationships

Pattern Cards for Stringing Beads General Learning
Pupils to string beads to reproduce the pattern shown on each card (Set A beads in actual size, set B beads in half-size)

Soap-film Shapes SEE
Wire shapes that are dipped in soapsuds to make six different geometric shaped soap bubbles

measurement concepts

Balance Scale
Available from several sources, to set up weight experiments, to develop addition and subtraction, and to reinforce renaming concept by use of concrete objects

Flannel Money Pieces Instructo
A piggy bank, items to be bought and sold, and coins to be used on a felt board

Judy Clock General Learning
Movable hands and visible functioning gears to provide learning experiences in telling time

Judy Mini-Clocks General Learning
Miniatures of the Judy Clock for individual pupil use

Sequence Cards Developmental Learning Materials
Four stories, Each with five cards picturing activities, to develop the concepts of order and seriation

Willbrook Discovery Math Work Cards ETA
Activity cards involving applications of weight, length, time, and capacity concepts

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films

Button's Tall Tower. 16mm, sound color. Universal Education & Visual Arts. (1–3)

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Seeing the Use of Numbers, Set I: "Time and Money," "Vocabulary 1." Color w/captions. Eye Gate House. (P–2)

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estimation

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problem solving

instructional slides

Harbrace Mathematics Instructional Slides: "Problem Solving." Color w/captions. Harcourt Brace Jovanovich. (1–6)

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TABLES OF MEASURE

	CUSTOMARY	METRIC
LENGTH	12 inches (in.) = 1 foot 3 feet (ft.) = 1 yard 1760 yards (yd.) = 1 mile	10 millimetres (mm) = 1 centimetre 10 centimetres (cm) = 1 decimetre 10 decimetres (dm) = 1 metre 10 metres (m) = 1 dekametre 10 dekametres (dkm) = 1 hectometre 10 hectometres (hm) = 1 kilometre (km)
AREA	144 square inches (sq. in.) = 1 square foot 9 square feet (sq. ft.) = 1 square yard 4840 square yards (sq. yd.) = 1 acre 640 acres = 1 square mile 1 square mile (sq. mi.) = 1 section (of land) 36 sections = 1 township	100 square millimetres (sq. mm) = 1 square centimetre 10,000 square centimetres (sq. cm) = 1 square metre 100 square metres (sq. m) = 1 are 100 square ares (a) = 1 hectare 100 hectares (ha)
WEIGHT	16 drams (dr.) = 1 ounce 16 ounces (oz.) = 1 pound 2000 pounds (lb.) = 1 ton (tn.)	10 milligrams (mg) = 10 centigrams (cg) = 10 decigrams (dg) = 10 grams (g) 10 dekagrams (dkg) 10 hectograms (hg) 1000 kilograms (kg)
VOLUME	1728 cubic inches (cu. in.) = 1 cubic foot 27 cubic feet (cu. ft.) = 1 cubic yard (cu. yd.)	1000 cubic millimetre 1000 cubic centimetr 1000 cubic decimetre
CAPACITY	**Liquid** 2 cups (c.) = 1 pint 2 pints (pt.) = 1 quart 4 quarts (qt.) = 1 gallon (gal.) **Dry** 2 pints (pt.) = 1 quart 8 quarts (qt.) = 1 peck 4 pecks (pk.) = 1 bushel (bu.)	**Liquid and Dry** 10 millilitres (ml) = 10 centilitres (cl) = 10 decilitres (dl) = 10 litres (l) = 10 dekalitres (dkl) = 10 hectolitres (hl) =

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